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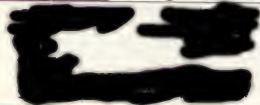
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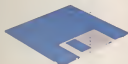


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144 Knockout Color Presentations

When you want your message to rise above the rest, say it with color. Black and white alone can't help you win over your audience, impress your boss, and make a sale the way that color can. Find out which tools will make you the master of your message—and guarantee a winning presentation. *PC/Computing's* special report reveals the best software and hardware to keep your audience riveted to the screen and glued to their seats.

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SEPTEMBER 1993



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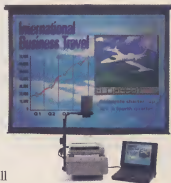
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Package 3

- ZIF socket upgradability to Pentium OverDrive CPU
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- Windows-accelerated VL local bus video with 1MB RAM
- Both 1.2MB and 144MB floppy drives
- MS DOS 6.0, Tools, Windows & new Microsoft Mouse, plus choice of either Ami Pro, Freelance, Improv Organizer, or the hot new Lotus 1-2-3 version 4.0!

- ZIF socket upgradability to Pentium OverDrive CPU
- 16MB high-speed RAM
- 528MB, 13ms local bus IDE hard drive w/128K cache
- Windows-accelerated VL local bus video with 1MB RAM
- Both 1.2MB and 144MB floppy drives
- MS DOS 6.0, Tools, Windows & new Microsoft Mouse, plus choice of either Ami Pro, Freelance, Improv Organizer, or the hot new Lotus 1-2-3 version 4.0!

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| 486DX-33 | \$1695 | \$1995 | \$2295 | |
| 486DX2-50 | \$1795 | \$2095 | \$2395 | |
| 486DX2-66 | \$1895 | \$2195 | \$2495 | |

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- Upgradable processors that let you upgrade to Intel's Pentium OverDrive architecture.

- Zero Insertion Force (ZIF) socket makes upgrading easy.
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- five 16-bit and one 8-bit.

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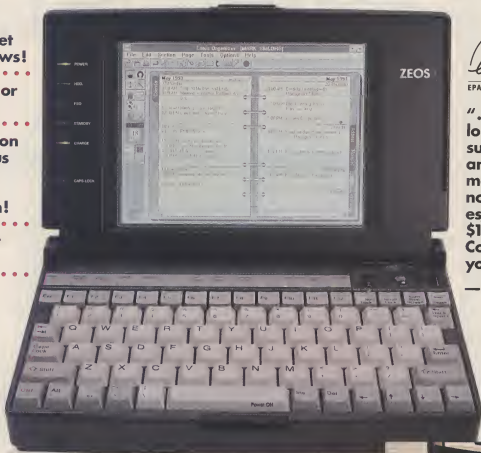
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acceleration!**

**VGA backlit
screen**

**Built-in
trackball**



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then the
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your best bet."**

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Smaller than a notebook. Lighter than your briefcase. The ZEOS Contenda subnotebook is proof that great things come in small packages...including plenty of power to run Windows wherever you go!

We start with a smart Intel SL processor — your choice of either a 386SL-25 or new 486SL-25. You'll find that the Contenda's processor extends your battery life significantly — because it's intelligent enough to power-down the memory, disks, modem and more when they're not in use.

What's more, the Contenda's features make it a pleasure to use. Features such as a high-resolution backlit screen that's crisp and vibrant. A built-in trackball so you won't have to tote a mouse around. And with a standard 80MB hard drive, memory up to 10MB and weight of less than four pounds, it's one powerful, portable Windows workhorse!



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Lease: \$59/month

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486SL Contenda: \$1795

Lease: \$66/month

- 4MB RAM
- 80MB IDE hard drive

PACKAGE 2

386SL Contenda: \$1595

Lease: \$62/month

- 4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- MS-DOS 6.0
- Microsoft Windows 3.1
- Lotus Organizer

486SL Contenda: \$1995

Lease: \$73/month

- 4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- MS-DOS 6.0
- Microsoft Windows 3.1
- Lotus Organizer

FAVORITE OPTIONS

ACCESSORIES

- External 3.5" floppy disk drive **\$99**
- Extra battery **\$99**
- External charging stand **\$79**
- Custom leather carrying case **\$129**
- Custom nylon carrying case **\$79**
- DC-DC adapter **\$49**

MEMORY UPGRADES

- 386SL: 2MB to 4MB upgrade **\$99**
- 386SL: 4MB to 10MB upgrade **\$561**
- 486SL: 4MB to 8MB upgrade **\$198**

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- Internal 2400 bps modem with 9600 bps send fax and 4800 bps receive fax **\$99**
- Xircom Ethernet adapter (10BT or Coax) **\$349**

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Lease: \$69/month

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- 80MB IDE hard drive
- External 3.5" floppy disk drive
- Custom nylon carrying case
- Extra battery
- Internal 2400 bps modem with 9600 bps send fax and 4800 bps receive fax
- MS-DOS 6.0
- Microsoft Windows 3.1
- Lotus Organizer

486SL Contenda: \$2395

Lease: \$87/month

- 8MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
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- MS-DOS 6.0
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- IDE hard drive.
- Display: 640 x 480 VGA backlit, 23 dot pitch, Sharp 74" diagonal, up to 64 shades.
- 256K (386SL version) or 512K (486SL version) video RAM.
- 486SL version includes 3.3v technology for added battery life, PI local bus for Windows acceleration, high-speed floppy drive controller.
- Supports simultaneous display with an external SVGA color monitor.
- Replaceable and rechargeable NiMH battery.
- 80-key keyboard with embedded numeric keypad and easy-to-use built-in trackball.
- One serial port, one parallel port, one video port, and ports for optional internal fax/modem and external floppy drive.
- AC adapter with full range from AC110-240V to DC.
- Power Management: Fully featured, including De-turbo, programmable Standby features and Suspend to disk.
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- 9.7" x 6.1", 3.9 lbs.
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180MB**
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**Tilt & swivel
display**



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STANDARD WITH EVERY ZEOS FREESTYLE:

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- RAM expandable to 20MB (486SL) or to 10MB (386SL).
- IDE hard drive expandable to 180MB.
- 256K (386SL version) or 512K (486SL version) video RAM.
- Internal 3.5" 1.44MB floppy disk drive.
- One serial port, one parallel port, one external video port, one PS/2 port for external keyboard, mouse or 10-key numeric pad.
- Supports an external SVGA color monitor with simultaneous display capability.
- 486SL version includes 3.3v technology for added battery life.
- Replaceable and rechargeable NiCad battery.
- 640 x 480 VGA backlit LCD display, 9.5" diagonal, supporting up to 64 shades of grey.
- Unique tilt and swivel display.
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486SL Freestyle: \$1695

- Lease: \$61/month*
- 4MB RAM
 - 80MB IDE hard drive
 - MS-DOS 6.0

PACKAGE 2

386SL Freestyle: \$1795

- Lease: \$65/month*
- 6MB RAM
 - 120MB IDE hard drive
 - Custom nylon carrying case
 - MS-DOS 6.0
 - Microsoft Windows 3.1

486SL Freestyle: \$1995

- Lease: \$72/month*
- 4MB RAM
 - 120MB IDE hard drive
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 - Microsoft Windows 3.1

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386SL Freestyle: \$2295

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 - Custom nylon carrying case
 - Extra battery
 - External charging stand
 - MS-DOS 6.0
 - Microsoft Windows 3.1

486SL Freestyle: \$2495

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 - Custom nylon carrying case
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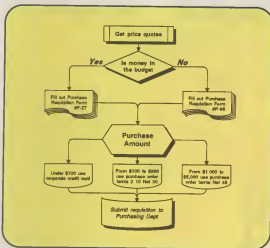
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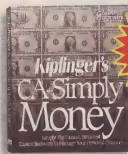
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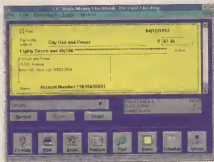
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Dear Ted Turner: Forget the Movies—Can't You Colorize My Office?

TED TURNER HAS THE RIGHT IDEA. HE JUST HASN'T GONE far enough yet.

Instead of colorizing perfectly good black-and-white films like *Casablanca* and *It's a Wonderful Life*, Turner and his elves ought to whip out their paintbrushes and get to work in the American office, where their technological wizardry might do some real good. Our Pentium-powered PCs may be living in the MTV-era nineties, but as soon as you look away from the screen you might as well be back in the monochrome fifties.

If you don't believe me, just look at what's missing from this issue's celebration of color. We've got presentation graphics software that can make even a Steve Jobs business plan look like a license for printing money. We've got special-purpose printers that can turn quarterly reports into Kodak moments—if you don't mind spending time and money. And we've got LCD projection panels that are perfect for sharing a megapixel display with a roomful of friends and sales prospects. But the mainstays of the American office—the laser printer, the fax machine, and the copier—still look like they're stuck in a *Nick at Nite* rerun.

I don't care what color Peter Lorre's fez was. But when someone shows me a spreadsheet in which the bottom line is negative, I want the red ink to jump off the page. Trouble is, the only way I can see red in my office is to stare at a monitor. As soon as paper gets involved, we're back to shades of gray. And that's not right. Here are a few golden opportunities for a few smart engineers.

Everyday Color Printing

The penny-pincher in me—the guy who's paid to keep the red ink away from the bottom line—starts to turn cyanotic at the thought of giving mere mortals easy access to a color printer. Think of a thermal wax-transfer printer, where printing performance is measured in dollars per page instead of the other way around. Do you want some temp in accounting to accidentally send 100 pages of regional sales reports to the thermal transfer printer in the art department? Of course not.

But imagine how you'd approach printing if your laser printer could do spot color for pennies a page. You wouldn't have to sprint halfway across the floor to shove a sheet of letterhead into the departmental laser every time you printed a cover letter—just apply the letterhead style and let the printer position the color logo exactly where you want it. And wouldn't your reports look more intelligent if your bar charts were filled with bright reds and blues instead of muddy crosshatches and dot patterns?

Actually, this technology may be just around the corner. QMS is about to ship its ColorScript 1000, a rugged laser that prints black and white at 8 pages per minute, adds spot color on demand, and should sell for just over \$12,000. Take that, HP!

Full-Color Faxing

It was a major victory to replace that slick, smelly, expensive fax paper with plain paper. But let's not stop there. These days—thanks to the omnipresent fax modem—fax machines are essentially nothing more than long-distance laser printers. So as long as we're upgrading the network printer, why not work on the fax machine too?

Yes, it might make the image files a tad larger and take a bit longer to send. Maybe we need a piece of system-level software that does for color what Adobe's Acrobat does for typography. If I could count on having a 300-dpi color device at the other end of the fax, I'd never lick another stamp.

Color Copies

Of course, the fatal flaw of any color output device becomes clear as soon as someone new walks into the conference room and needs a copy of your presentation. Your office copier can probably do 100 double-sided copies of this magazine, three-hole-punched and stapled, faster than you can say "copyright infringement." But ask it to add color, and it'll just bat its LCDs at you.

Fortunately, the same laser engine that works for printing ought to make perfect copies. And the technology isn't expensive; just look at how fast those color printer prices are falling nowadays.

True, everyone will use a color copier to broadcast their

Is our office equipment stuck in a "Nick at Nite" rerun?

co-workers with high-resolution copies of *Doonesbury* and *Outland* cartoons. So what?

The story has always been the same when it comes to color: It adds information, and it beats black-and-white. Remember the days of monochrome monitors? As soon as prices fell on color monitors, color became the rule—because color adds information. I want a color printer and a color copier and a color fax machine. And to show how serious I am, I'm going to hold my breath until I turn . . . gray? See what I mean? Even threats just don't have the same impact without color.

Do you agree or not? Send your thoughts on color to Colorize Me, PC/Computing, 950 Tower Lane, 20th Floor, Foster City, CA 94404. We'll print the strongest and most colorful opinions in a future issue. ■



LET'S ALL
GIVE EXCEL
A BIG HAND.

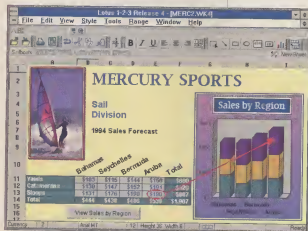
NOW, INTRODUCING YOU'VE BEEN

LOTUS INTRODUCES 1-2-3 RELEASE 4 FOR WINDOWS.

THIS IS CLEARLY A TIME OF CHANGE FOR AMERICAN BUSINESSES.

To keep up with these changes, business people need new and better-suited tools. Lotus® has responded by rethinking and re-creating the spreadsheet as a tool for individuals and for workgroups. 1-2-3 Release 4 incorporates over 4,000 spreadsheet user suggestions. It's dramatically easier to learn and use than any spreadsheet in history. And it's the first spreadsheet that's actually designed to help people work together in impressive new ways.

IT'S MORE POWERFUL
BUT VERY SIMPLE.



While adding dozens of major new features, hundreds of macros and hundreds of tools and @ functions, Lotus has actually simplified the way

you work in a spreadsheet.

For example, Release 4 features an @ function pull-down menu to help you

build spreadsheets faster. Cell copying is now a simple drag-and-drop operation, with meaningful visual feedback. And changing text and font attributes is done in one dialog box. (Excel often requires three)

So 1-2-3® is not only a lot friendlier and easier to use than any other spreadsheet, it's a significant advance over Microsoft® Excel in usability.

THE FIRST
CONTEXT-SENSITIVE
USER INTERFACE.

“The SmartIcons in 1-2-3 for Windows are smarter, and Lotus’ approach to swapping different tool-bars in and out beats Excel’s and Quattro Pro’s.”
—PC Computing 6/93

Release 4 actually anticipates what tools and functions you’ll need. Depending on what you’re doing, 1-2-3 presents only the menu choices and **SmartIcon™** palettes appropriate to the operation at hand.

This means you won’t spend time clicking through menus looking for the features.

IMMEDIATE ON-SCREEN
MANIPULATION.

A **Live Status Bar** on screen
Automatic **Arial MT**

shows the attributes of any high-lighted element.

To make a change (like font size or decimal points) you just click on the appropriate section of the status bar. Then scroll up to your chosen attribute and click again.

And unlike Excel, 1-2-3 R 4 includes **In-Cell™ Editing**, so you can enter and edit any information right **in the cell.**

CING THE ACT WAITING FOR.

ONE-STEP CHARTING.

With **One-Step Charting**, you can pick up all titles, data, legends and axis labels right from the worksheet to create a great looking chart the first time, automatically. And you can edit the chart right in your worksheet.

NAVIGATE THROUGH 3 DIMENSIONS.

Anyone who works on multiple worksheets will appreciate the new 1-2-3 **Worksheet Tabs** which can be labeled with real words. So you can go directly to any sheet simply by clicking on the appropriate tab.

And Worksheet Tab names are then incorporated into formulas. All of which helps to keep 1-2-3's unique 3D technology simple and easy to use.

12 Height 14 Width 9

DATABASE FUNCTIONS MADE EASY.

“1-2-3 for Windows has always had more powerful database features than Excel or Quattro Pro, and now these features are also easier to use.”
—BYTE 6/93

The 1-2-3 database now has a new, completely graphical interface that makes using it easier than ever. Plus 1-2-3 provides a range of built-in

tools that are powerful without being perplexing.

For example, to modify or create a query, you don't generate criteria and output ranges with cryptic commands. Just bring up the Query Dialog Box and select the fields and records by name. Changing your query is as simple as drag-and-drop.

THE FIRST SPREADSHEET FOR WORKGROUPS.

Have you ever forgotten why you used a particular number? Or wanted to track more than one value in a cell or range? Suppose you've sent a spreadsheet to a co-worker

who develops a whole new version and sends it back? How do you integrate it into your work?

You use the **Version Manager**, that's how. It tells you who did what when, and why they did it. It lets you save, label, track, mix, match, merge and comment on ranges, worksheets

“It (Version Manager) also makes Microsoft Corp's Scenario Manager in Excel 4.0 look like a toy by comparison.”
—PC Week 5/3

or entire files. And it does it all without overwriting existing data.

If you have Lotus Notes® the workgroup benefits of the new 1-2-3 take on even greater proportions. Now different users can access and work on the same spreadsheet at the same time. Notes maintains file integrity and notifies you of changes made by others. So you know you're using the right numbers.

THIS IS THE BIG ONE.

Lotus 1-2-3 Release 4 is here. And it's the smoothest path from DOS

to Windows™. Plus, it's network ready. So one box is all it takes to upgrade all your users, whether they're work-

ing off a server or their own PC.

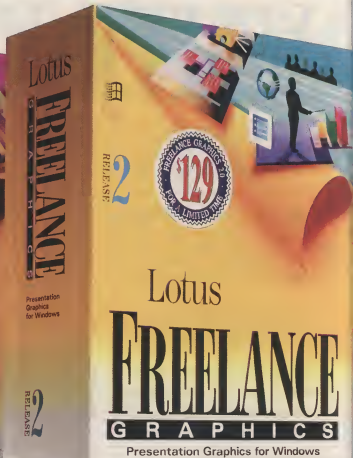
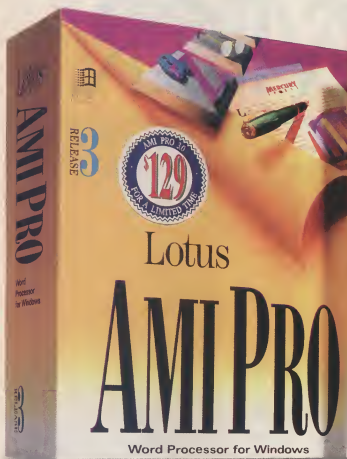
Call 1-800-TRADE UP, ext. 9003*

for a free demo disk or to order your upgrade for just \$119 direct from Lotus. Or visit your Lotus Authorized Reseller.



Lotus 1-2-3 Release 4
SPREADSHEET FOR WINDOWS

1-2-3 IS BACK. AND

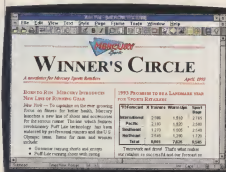


SYNERGIZE AND SAVE

For a limited time, when you get Lotus® 1-2-3® Release 4, you'll save on the industry's top-rated desktop applications. Applications designed to work with and optimize the power of 1-2-3.

In other words, you'll save money, time and work. And if you're just climbing into Windows, Lotus makes the whole transition a lot easier.

**BUY 1-2-3 RELEASE 4
AND GET AMI PRO 3.0
FOR \$129***



Ami Pro is rated best word processor. Its tight integration with 1-2-3 Release 4 makes it even better.

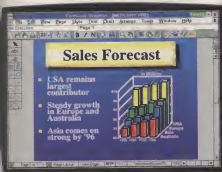
Ami Pro® 3.0 has been rated the number one word processor by virtually every critic and reviewer. Edipsing both Microsoft® Word and WordPerfect®. If you're wondering why, there's no time like the present to find out.

Simply put, Ami Pro is a faster, easier, friendlier word processor to use. It produces such great-looking documents with so little effort most people never even bother to open the manual.

IT'S NOT ALONE.

Plus Ami Pro has the tightest integration with 1-2-3 Release 4. Features like shared Dictionaries, SmartIcons® and a Live Status Bar make Ami Pro the best choice in word processors for 1-2-3 users.

**BUY 1-2-3 RELEASE 4
AND GET FREELANCE
GRAPHICS 2.0 FOR \$129***



Freelance Graphics 2.0 is the easiest presentation software. With the new 1-2-3, if you change the spreadsheet, the presentation changes itself.

According to reviews and independent testing labs, there is no faster or easier way to create professional presentations than Freelance Graphics® 2.0. Its SmartMasters™ and one-click access to galleries of chart styles and symbols make it easy for anyone to make great color or black and white presentations in any format including handouts. In the most recent Usability Sciences Corp. study, it took 64% less time to create a presentation with Freelance Graphics than with Microsoft Powerpoint®.

Like Ami Pro, Freelance offers

Working Together® capabilities with 1-2-3 and other Lotus applications that open up a whole new world of ease and usability. You can simply import a graph from 1-2-3 and it will arrive in your Freelance presentation, fully editable.

GET THE BEST OF ALL WORLDS WITH SMARTSUITE 2.0

As 1-2-3 has done for spreadsheets, the new Lotus SmartSuite™ has dramatically redefined the idea of applications working together.

Taken one at a time, the five applications in Lotus SmartSuite are a Windows™ desktop All-Star team. The new 1-2-3 Release 4 spreadsheet. Ami Pro 3.0 word processor. Freelance Graphics 2.0 presentation graphics software. ccMail™ far and away the industry's top e-mail system. And Lotus Organizer™ the multi-award-winning desktop personal information manager.

Others talk about application integration, but compared to SmartSuite, it's all token.

Together, on one desktop, Lotus SmartSuite is unarguably the most powerful, most integrated suite in the industry. Once you're comfortable with one application, like 1-2-3, you're

instantly at home in all five. More impressive, SmartSuite now ships with the Working Together Bonus Pack a unique set of features designed to dramatically enhance the integration between Lotus Windows applications. This makes moving from application to application so quick and easy, and using functions from one application while working in another so natural, it feels like the entire suite is one piece of software. And there's absolutely no reason to settle for anything less.

So visit your Lotus Authorized



Once you're comfortable with one application, like 1-2-3, the common look and feel makes you right at home with all five.

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Hardware Superguide Sounding Board

It was the best 200, it was the worst 200; there was tough luck for lefties and greed among us.

Missed the Mark

Your "Hardware Buyers' Superguide" (June, page 124) covered everything but the facts. You list the 11 "best" low-cost PCs (page 134), but you don't specify the systems' components. Sure, the systems all met certain base requirements, but for all we know, you're comparing 486DXs with 486SXs and 100MB drives with drives that are who knows how large.

Your readers don't say, "Oooh, this was rated the best by *PC/Computing*, so I'd better buy it." No, they want to know how big the drive is, how much RAM comes with the system, whether it has VESA local bus, whether the monitor is noninterlaced, whether it offers flicker-free performance at 1,024 by 768 pixels, how fast the video board is, and then how *PC/Computing* rates it.

KEN TANNER
WOBURN, MASSACHUSETTS

Most PC manufacturers sell models at two or three CPU levels that would fit in this category, and each model can often be configured with various RAM, hard drive, and video specifications. In the end, winning models are the best-variant products. When the tested models varied significantly from the general specifications outlined on page 134, the features were noted in the "Pros and Cons" column on page 136. —Scot Finnie

Your comparison of single-user tape drives (page 270) was timely, but some of your conclusions about QIC-80 tape drives concern us. You selected the Jumbo 250 from Colorado Memory Systems as the best choice. We share your respect for this market leader, but it's not for everyone. For people who need a 1-inch-high internal version and those

who need one that reads Irwin formats, Iomega's Tape250 is the only choice.

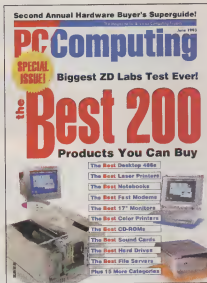
Your comparison also included both drives with floppy disk interfaces and parallel port interfaces, which doesn't help your readers make buying decisions. The parallel port was originally designed strictly for printing and was a unidirectional interface. Clearly the highest-performance and lowest-cost choice is a drive with a floppy disk interface.

We are disappointed that the Iomega

Iomega has been an active participant in the development of this standard.

The real message in your article should have been this: Purchase now if you simply must have a parallel port tape drive, but look forward to much better performance in these drives in the near future.

FAROUK AL-NASSER
PRESIDENT, IOMEGA TAPE UNIT



Tape250 Parallel Port was not ranked higher. We strongly urge your readers to be aware that any parallel port drive purchased today offers convenience, but at a price. You must trade ease of installation for cost and performance.

Help is on the way via the new IEEE standard 1284, which defines a much higher-performance bidirectional interface that even includes daisy chaining of multiple peripherals on the parallel port.

As a satisfied owner of LaserMaster's WinPrinter 800, I was appalled that it wasn't included in your ranking of the best high-resolution laser printers in the "Hardware Buyer's Superguide" (page 198). Not only is it a true 800-dot-per-inch PostScript laser printer, but I purchased it three weeks ago for \$1,095.

The WinPrinter 800 will match the output of any of the printers reviewed in your June issue. It's fast and foolproof, and it installs without a hitch. LaserMaster has a winner here, and I wonder why it wasn't covered.

PATRICK F. VALELLA
JACKSONVILLE, FLORIDA

We liked the LaserMaster WinPrinter 800 too, but it didn't match our criteria for evaluation. High-resolution laser printers had to print at least 8 pages per minute. The WinPrinter 800 prints only 4 pages per minute—very slow for large files printed at higher resolutions. —Cindy Bates

You should revise your weighting ratios for the best 386 notebooks (page 146). Dell notebooks placed second and fifth, but the company's stock has fallen because of poor notebook sales. Meanwhile, Compaq is the top seller of notebooks in Europe.

What's the story? Have you hired a

Letters

government statistician or were the results compiled by John C. Dvorak?

ARTHUR F. CLARKE, JR.
ANDOVER, NEW JERSEY

After reading your high-speed fax modem reviews in the June issue (page 288), I have doubts about *PC/Computing's* objectivity. I can understand an 8.1 rating (your lowest) for ZyXel's documentation, but how do you get an 8.1 rating (again, your lowest) for service and support when the company maintains a 24-hour support BBS, provides direct telephone access to qualified technicians, and offers unrestricted BBS access to EPROM image files of new firmware releases for all of its modems? Looks like I have to award you a 10.0 rating for bias.

JIM GAFFNEY
EL PASO, TEXAS

Among other things, our service-and-support factor was based on a series of anonymous phone calls made to tech

support over a period of days. We asked easy and difficult technical questions, and gauged considerations such as how long we were put on hold before we spoke with a technician and how completely and accurately our questions were answered. The availability of 24-hour, toll-free support also was weighted heavily.

—Scot Finnie

Couldn't Agree More

Today I received the *PC/Computing* issue featuring the "Hardware Buyer's Superguide" (page 124). I see that the Insight 486SX-25 was chosen as one of the best products and that editor Dylan Tweney picked it as a personal favorite.

Last fall, I purchased an Insight 486SX-25 to replace an old Amstrad XT clone, and I haven't looked back since. I've been quite pleased with the machine's operation and with Insight's service.

I'm printing this letter with a Canon BJ-200, your top-ranked ink jet printer.

Once again, I have chosen a product voted best by your publication.

DOUGLAS J. MASTERS
TYLER, TEXAS

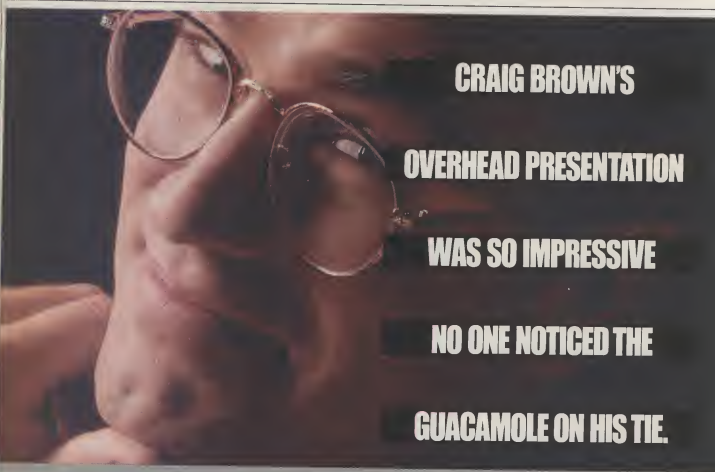
Going for the Gold

After discussing our absence from the 200 best hardware products story with a *PC/Computing* editor, our company has made several changes and will be working on several more: We have increased our two-year warranty to a limited lifetime warranty. We have restructured the way we monitor our BBS in order to handle user questions in a more timely manner. And we will introduce a toll-free product and technical-support telephone number, easier installation software, and manuals with better illustrations.

ROBERT HOSKINS
MARCOM MANAGER, STB SYSTEMS

Writing in the Real World

What PC lessons have I learned in the real world ("In the Silence of the Testing



CRAIG BROWN'S
OVERHEAD PRESENTATION
WAS SO IMPRESSIVE
NO ONE NOTICED THE
GUACAMOLE ON HIS TIE.

Letters

Lab, You Can't Hear the Real-World Story," Bott, June, page 28)? When it comes to software, upgrades don't always get better. No one has come up with a better, more versatile word processor than XyWrite III Plus, although WordPerfect for Windows—by far the best of the Windows products for serious writing—comes close.

As for hardware, you can't judge equipment by its specs. My Dell 386/25 runs rings around my 386/40 clones in hands-on use. And of my two 386/40s, the board that shows superior test results processes at only half the speed of the other in actual use, although the two systems are configured almost identically. Nothing I've tried has brought the first unit up to snuff.

ANTHONY F. JANSON
APEX, NORTH CAROLINA

Get a Handle on the Hype

I don't understand the hoopla about object-oriented computing ("Taligent's

Pink: A Red-Hot OS, but Oh Those Marketing Blues," Smith, June, page 114). What *object oriented* means to me is *modularity*, a concept that has been around for a long time. Modularity was one of the basic principles of ancient philosophy. In fact, one can argue that mathematics itself is object oriented. And one of the first lessons in computer programming (more than 40 years ago) involved breaking things down to their discrete parts.

Developing object-oriented systems should have always been a high-priority goal in the computer industry.

BARRY M. KARAS
PALM BEACH GARDENS, FLORIDA

Gina Smith describes how object-oriented word processors and other apps will be sold in modules, which will provide "obvious cost benefits." Sure they will—for the software publishers.

Today I can get a full-featured word processor that includes drawing functions,

desktop publishing features, and more for about \$99 (for example, a WordPerfect competitive upgrade).

In the future, I will get a base module (Gina Smith calls it a "base application," but I call it a "stripped-down" application) for probably about the same price as I pay now for the full-featured application. Lucky me—I'll get to shell out more bucks for what is currently included in the application! And network owners will shell out more for each user.

Software marketing people will love object-oriented applications—the light at the end of the low-cost software tunnel.

The only way these object-oriented applications can provide obvious cost benefits is if a fully comprehensive set of modules is included in the base applications and the user gets to choose which ones to install. Can this idea fly? Can it get past the software marketing departments? Nah! It makes too much sense!

STEVE CAPPS
KNOXVILLE, TENNESSEE



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1991, 1990

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| Back-UPS 400 | Desktop 386, 486 systems, 286 servers | \$249 | \$229 |
| Back-UPS 450 | Tower 386, 486 systems, servers | \$329 | \$279 |
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Letters

A Simpler Solution

After reading Gil Schwartz's "I Blew Off My Screen Saver—And I'm Glad! Glad, I Tell You!" (June, page 108), I wondered why he took the drastic step of deleting his screen saver when it interrupted his work. After Dark lets you set the length of PC inactivity after which it turns on the screen saver. Why doesn't Mr. Schwartz set it for 10, 20, or 50 minutes, and use the quick-key option to activate the screen when he leaves his desk? You can also use a password to protect any work you are currently engaged in. Maybe I'm missing something, but using these features seems less brutal than purging everything.

CHARLES DOUGLAS
WESTMINSTER, COLORADO

Clean Up Your Act

Penn Jillette's taste in words and topics is insulting, degrading, and disgusting ("I Want More Bias—And Less News," June, page 394). I did not subscribe to *PC/Computing* to read about his sexual fantasies or to be sworn at. Being an American has nothing to do with supporting a president you don't believe in.

I do not need to be insulted by or subjected to such poor taste in editorial. Publishing competition is tight, and you have lost this customer.

ROBERT G. SHURTLEFF III
FOUNTAIN, COLORADO

No More Mr. Bill

Your magazine is the cat's pajamas. It's one of the few truly user-oriented computer magazines available. If, however, you never print another Bill Gates article, it will be much, much too soon. Enough on Mr. Bill.

STEPHEN R. CORLEW
ARGYLE, NEW YORK

Left Out of the Loop

After reading the praise of the *PC/Computing* editors, I rushed out to buy Microsoft's new mouse (New!, June, page 82). Both the review and the marketing blurb on the box said it was for right- and left-handed users, and that it was comfortable in either hand.

I disagree. I don't care what the ergonomics experts say, and I don't care how much Microsoft paid for its research, this mouse is made to be used in the right hand. I will grant you that occasionally

switching hands is probably ergonomically correct, but I called Microsoft's sales department to discuss this and was told that the company's studies indicate that 90 percent of left-handed people hold and use the mouse in their right hand.

I guess I must be in the minority. I use my left hand. Always. I'm disappointed that Microsoft doesn't make this product for lefties. Real lefties.

LAURA FREDERICKS
JAMAICA, NEW YORK

The Buck Stops Here

The computer industry is a greed machine. My 1989 XT is obsolete. Software is upgraded as soon as users come close to mastering it. Thousands of users will never learn to use computers because of the fear that they can't catch up. Thank goodness for DOS and the 640K barrier, or computer whizzes would be completely out of control.

The buck stops with my 486. I'm not upgrading again until my two-year-old daughter needs the latest technology for college or I've sucked the last byte out of this overvalued machine.

MIKE WAYNE
OTTAWA, CANADA

Doing the Right Thing

In searching for a PC magazine to assist me in making purchase decisions, I look for one that carries more than endless product reviews, tedious benchmark test results, a plethora of glossy advertisements, and bored columnists urging users to buy more and more.

I want intelligent and useful advice, penetrating interviews, and thoughtful, articulate columnists who expound on topics indirectly affected by computers—in general, a computer magazine with a worldly attitude. *PC/Computing* is such a magazine.

EDDIE RUSSELL
SAN DIEGO, CALIFORNIA

The magic of your magazine is that it serves as a reference tool. When I decided to buy my notebook computer, I consulted several back issues. The January article about notebooks subjected to a torture test really helped my decision making. I've done similar research with just about every purchase—software and hardware—I've made since I subscribed. Your magazine

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Letters

goes beyond sales hype and keeps me from making unwise impulse buys.

STEVE WEISGER
SONOMA, CALIFORNIA

You publish the best PC magazine going. I have subscribed through June 1994, and I may not renew subscriptions to other PC magazines because they don't provide nearly as much information as you do.

The tear-outs, zippy secret weapons, and wonderful tips you offer for commonly used programs are invaluable.

LOU POOLE
SAVANNAH, GEORGIA

Formula for a PC PC

With so many consumers concerned with making politically correct purchases, I'd like to outline some features that would be included in politically correct software:

- The ability to shut down the PC and monitor during periods of inactivity.
- Minimal and recyclable packaging.
- Online help manual and tutorial.

- Minimal disk space and memory requirements.
- An uninstall program.
- Protection from viral infection and unauthorized alterations.
- Good integration with object linking and embedding and dynamic data exchange applications.
- A reasonable price.

ROBERT LEONG
BRUNEI, BORNEO

Corrections

In the June "Hardware Buyer's Super-guide" High-Res Video Cards category (page 232), we incorrectly stated the Diamond Stealth Pro's vertical refresh rate. It provides 72Hz refresh rates at resolutions up to 1,280 by 1,024 pixels. The overall ranking is unaffected; the proper rate was used in scoring.

A batch file printed in June Help (page 317) is missing three lines that will make it run CHKDSK automatically. In order to make DISKCHK.BAT work

properly, you must replace the line

IF NOT EXIST ERRCHK.ERR GOTO CLEAN

with the following two lines:

IF EXIST ERRCHK.ERR GOTO FIX
GOTO CLEAN

Then, add the line

:FIX

before the line

ECHO Y | I CHDSK /F

PC/Computing regrets the errors.

Mail your thoughts to Letters, PC/Computing, 950 Tower Lane, 20th Floor, Foster City, CA 94404; fax us at (415) 578-7029; or contact us via MCI Mail at PCC Editorial or via PC/Contact, our online forum. Letters must be signed and must include a daytime phone number. All letters become the property of PC/Computing and will be edited for length and clarity.

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- Auto detects and reattaches to new file servers
- Simultaneous queue server and PSERVER

TCP/IP FEATURES

- Finds IP address from BOOTP, RARP, or memory
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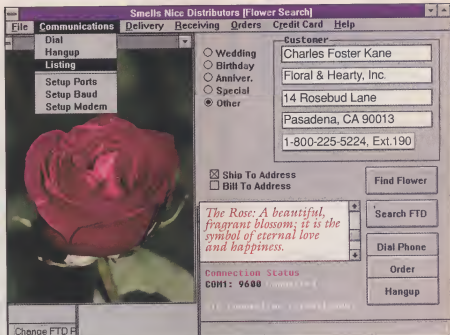


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New!

THE WORLD'S LIGHTEST PCs ARRIVE . . . ALMOST

486 Subnotebooks



WINNING WAYS ▲
The full-size version of IBM's ThinkPad was a 1992 *PC/Computing* MVP award winner, and its tiny cousin (above) retains many of that system's best features.

Case in point: IBM's centrally placed red pointing device is comfortable, and most of our usability testers praised it. However, the subnotebook's 7.4-inch display is three inches smaller than its larger sibling's.

WHO WANTS TO settle for second-best? Six-pound notebook PCs pack all the power of desktop systems, so why bother with the nagging compromises of their smaller cousins? Two words: O'Hare Airport. Or Hartsfield, or Stapleton. Take your pick.

Anyone who has trekked the length of one of these airports with a portable PC in tow knows that when you add a battery charger, an extra battery, a modem, and other paraphernalia, the total heft can tip 12 pounds. For light computing needs—typing e-mail, tapping out simple memos, tweaking spreadsheets—that kind of weight isn't worth the trouble.

It's hardly surprising, therefore, that subnotebooks have matured quickly from flimsy gizmos to PC workhorses. For this comparison, we lined up five first-generation 486-based models from Altura, Compudynes, IBM, Twinhead, and Zeos. All of them come equipped with 80MB to 170MB hard drives, keyboards that are fully touch-typeable, and backlit displays. All of them make compromises, but all weigh 4 pounds or less.

They're Not Perfect

Let's start with the compromises. All the subnotebooks we tested use external floppy disk drives. None offers more than 3½ hours of battery life. And keyboards and displays don't match those found in larger notebook PCs. To gauge the real-world impact of these compromises, we put these subnotebooks through rigorous usability tests in the *PC/Computing* Usability Lab.

What did we learn from these tests? The most important thing is that users really, really care about displays and keyboards.

For example, our lab testers—all of whom were outside volunteers—felt that although the IBM ThinkPad 500 offers a superb keyboard layout, it doesn't measure up to the longer travel and crisper response of the Twinhead and Zeos keyboards. Even though the Zeos Contenda flew past the other machines in Windows performance tests, our usability testers found Windows more hospitable on the IBM, which easily boasts the brightest, most legible display.

ThinkPad Lust

Overall, IBM's ThinkPad 500 won the highest marks in our usability tests. The ThinkPad we had was, however, a prerelease unit. It provided reliable speed test results, but battery life tests were erratic.

Powered by Big Blue's own 25/50MHz 486SLC CPU, the ThinkPad comes with 4MB of RAM (expandable to 12MB), an 80MB removable hard drive—or an optional 170MB drive—one PCMCIA Type II slot, support for an external VGA monitor, and the same Track II pointing device that has made the ThinkPad 700 series notebooks so successful. Bottom line: It squeezes the features of a first-rate notebook into a 3.8-pound package that measures a svelte 7.25 by 10 by 1.63 inches. The system also clocked the best time on



TRADE-OFFS

Despite its respectable speed showing, usability testers didn't take to the Altura's unusual pointing device.

Are a Mixed Bag

our Word for Windows speed tests—a torturous mix of disk-, CPU-, and memory-intensive tasks.

The design of the IBM ThinkPad reflects tender loving care. Peripherals snap into place. Port and door covers are easily accessible, crafted to save space but still convenient. Mouse buttons for the pointing stick have been moved to the front of the unit, perpendicular to the keyboard. The battery charger is small and uses only one cord. Our favorite design extra in the ThinkPad: The unit itself plugs into a two-prong wall socket, and, when not in use, the two power prongs pivot to tuck inside the ThinkPad's charger.

You pay for the ThinkPad's light load with a tiny 7.4-inch display and a keyboard that provides only 3 millimeters of key travel. IBM has taken pains to offset both these limitations, though. Unlike many 64-gray-scale displays, which tend to be murky, the ThinkPad's is brilliantly sharp and bright. And despite the short, spongy throw of the keys, key layout is a marvel. Cursor controls are undersized, but they form the customary inverted T. Dual Alt keys sit on either side of the space bar, and there are independent Page Up, Page Down, Home, and End keys.

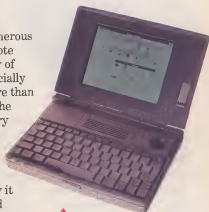
Keyboards You Can Type On

Twinhead's Slimnote 4SLC/33M system takes the opposite keyboard design tack: It scraps independent document controls for full-sized cursor keys. More important, the Slimnote manages a big keyboard feel with long key travel and crisp response. We'd happily swap the trackball in the upper-right corner of the subnotebook for the HP OmniBook 300's mouse-on-a-stick (see "Mobile Computing Superguide," July, page 191) or another device. But pointers aside, the keyboards on the Twinhead and its clone, the Compudyne SubNote, rank tops in our usability tests.

The Twinhead's 8-inch display is generous by subnotebook standards. The Slimnote screen lacks the brightness and clarity of the IBM's but won't disappoint—especially given the machine's battery life of more than 3 hours. An LCD on the right side of the Twinhead's display panel shows battery consumption and system status. It's a thoughtful design feature we'd like to see on all portables.

The Twinhead is also powered by Cyrix's 33MHz 486SLC, which is why it outperforms the 25MHz 486SL-based Compudyne. Our unit came with 4MB of RAM (2MB is standard) expandable to 8MB, one PCMCIA Type II slot, and an 85MB hard drive. If the ThinkPad's keyboard fails to pass muster with you, the Twinhead is the one to get.

Or you can simply get its clone. The Compudyne 4SL/25 SubNote is exactly the same unit as the Twinhead, except that it has a slower processor. In our speed tests, it delivered very slow performance, but it bested the Twinhead's already outstanding

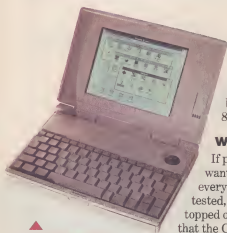


SMART KEYBOARD

Like its near-done cousin—the Compudyne—Twinhead's subnotebook got good marks on its keyboard design and feel in usability tests. However, the Twinhead and Compudyne weren't the fastest systems we tested.

WHY WE LIKE THE IBM THINKPAD 500

- **Great Display.** Big Blue's monitor, which is copable of displaying 64 shades of gray, isn't as murky as most. PC/Computing Usability Lab testers found it to be the shorpest and brightest of the bunch.
- **80MB Removable Hard Drive.** There's a 170MB option. Need we say more?
- **Cool Pointing Device.** Usability testers got persnickety about these, but they liked IBM's little red device, nestled in the middle of the keyboard.
- **Up-to-Snuff Design.** The details are token core of with the ThinkPad. It has a slick black case, intelligent port covers, and a small battery charger that uses only one cord. In addition, it plugs into a two-prong wall socket.
- **WinWord Muscle.** Of all the performance tests we run, none is a better measure of total system performance than the Word for Windows mixed-task test, which the ThinkPad won handily.
- **Independent Page Up and Page Down Keys.** IBM's keyboard wasn't the favorite in usability tests, but we appreciated these touches.
- **PCMCIA Type II Slot.** From storage to communications, PCMCIA dramatically broadens any subnotebook's expandability.



LOOK FAMILIAR?

Compydyne's subnotebook is nearly identical to the Twinhead's. The differences: The Twinhead uses a 33MHz 486SLC processor, which outperforms the Compydyne's 25MHz 486SL CPU by as much as 50 percent.

battery life by about 8 percent in our tests.

Want to See It Again?

If performance really matters, you'll want Zeos's Contenda, which blew past every other subnotebook we speed tested, although the IBM ThinkPad topped our word processing test. (Note that the Contenda was equipped with a math coprocessor, which significantly boosted its speed score in the Excel test.) Now in its second generation, the Contenda uses a 25MHz 486SL CPU and comes with 2MB of RAM (our test machine had 4MB) expandable to 10MB, and an 80MB hard drive. There's no PCMCIA slot, to our disappointment, but otherwise the machine features a full complement of ports.

The Contenda earned high marks for its tiny size (6.1 by 9.7 by 1.75 inches) in our usability tests. Despite its shortened depth,

the keyboard provides a crisp, responsive throw. We would have ranked it on a par with the Twinhead and Contenda keyboards except for a cardinal design sin: The cursor keys line up in a single row. And the pointing device, a wimpy, tiny trackball in the upper-right corner of the keyboard, is unusable. The Contenda's 7.4-inch display is the same size as the IBM's, and though it's not as clear or bright, it's perfectly adequate. At 4 pounds, the Contenda packs as much power as you can get in such a package.

Maybe Next Time . . .

Also weighing 4 pounds is Altura's Alt-sx25, a slightly oversized (7 by 11 by 1.5 inches) subnotebook powered by a 25MHz 486SX chip. Its feature set parallels most of the other machines we tested: 4MB of RAM expandable to 20MB, an 80MB hard drive, and a PCMCIA Type II slot. One major disappointment: The Altura's pointing

SURVEY SAYS: STRONG OPINIONS AND SASS FROM THE USABILITY LAB

There's just no substitute for real-world use. For this roundup of subnotebooks, eight volunteers spent hours in the PC/Computing Usability Lab. They evaluated each of the subnotebooks in a variety of environments, including direct sunlight and fluorescent lights.

Testers focused their attention on keyboards, displays, and pointing devices. Here is a collection of their conclusions:

COMPYDYNE SUBNOTE

Usability Test Snapshots: Some design flows; incomplete manual.

- "Battery pops out without warning—save, save, save."
- "Nice LED showing battery usage."
- "Full-sized cursor and function keys make navigating a document easier than on my notebook."

IBM THINKPAD 500

Usability Test Snapshots: Well-liked screen; intelligent design; small display.

- "Great display—best of the bunch."
- "Best placement of ports and controls."
- "Slimmest, easiest to carry peripheral."
- "The pointing device is easier for left handed users, but the cursor is easy to lose."

TWINHEAD SLIMNOTE

Usability Test Snapshots: Configuration was a breeze; thumbs-down for pointing device.

- "The pointing device is only slightly better than no pointing device at all."
- "The best status display of any here."
- "Solid little unit . . . feels rugged."
- "Display had better range of contrast than other units—and minimal glare."

ZEOS CONTENDA

Usability Test Snapshots: Weight and size drew raves; dumsy trackball.

- "Boo! for the pointing device."
- "There's nothing to like about the pointer on this unit."
- "Readable display in direct sun, but not as good as the IBM."
- "I could adapt to these cursor keys—but only until I could upgrade."

ALTURA ALT-SX25

Usability Test Snapshots: Clumsy pointing device; omissions in manual; fair display.

- "Backlighting works well in sunlight . . . very readable."
- "Mouse requires two hands—once too many."
- "Inadequate range of brightness and contrast."
- "Washed out display under fluorescent lighting."

device is a trackball in the lower-right corner of the machine with mouse buttons on the lower left. It requires two hands to use, which many usability testers found unacceptable.

The Altura did fairly well in performance tests, but its design presents other usability drawbacks. The system is plagued by a flimsy keyboard and stubborn port covers that are prone to breaking. However, the Altura does have a \$1,595 price tag—the lowest of the bunch.

The Bottom Line

Subnotebooks are headed for stardom. You can comfortably get work done on all of the systems we tested, and we were bowled over by the low price tags on these machines: Not one costs more than \$2,000. IBM's ThinkPad 500, which received raves from usability testers, was easily the favorite among the systems tested. Its beautiful display gets high marks, and it comes in a sleek, well-designed black case.

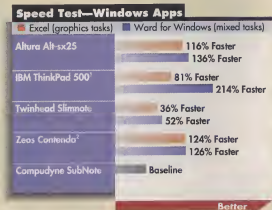
However, there are still too many compromises in subnotebooks for us to award any system the *PC/Computing* Usability Seal of Approval. Every one of the machines we tested fell down in at least one area. At the same time, new subnotebook designs are turning up at a fast and furious pace. Our dream system—and usability testers concur—has the ThinkPad 500's display, the Zeos Contenda's and ThinkPad's performance, the Twinhead's keyboard, and the CompuDyne's battery life. We're confident this dream subnotebook is only a few months away.

In the meantime, however, we'll take the ThinkPad.

MARTY JEROME

PC/COMPUTING LAB REPORT:

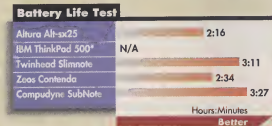
ZEOS AND IBM ACE SPEED TESTS



¹ The IBM ThinkPad 500 we tested was a prerelease system.

² The Zeos's moth coprocessor boosted performance.

COMPU DYNE DOES BATTERY LIFE BEST



*The IBM ThinkPad 500 we tested was a prerelease system.

THE SPEEDY ZEOS

The Contendo from Zeos drew mixed reviews from our usability testers. While they applauded the system's tiny size (6.1 by 9.7 by 1.75 inches), they unanimously disliked the Contendo's pointing device, a tiny trackball in the upper right corner of the keyboard. In our own use we found the device clumsy.

The other strong point of the Contendo was performance, especially in our Excel tests. Zeos's diminutive machine was a screamer. It was bested, though, by IBM's ThinkPad 500 in our Word for Windows tests.



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Lean and Green: Save the

WATTS MY LINE?

All the green PCs we tested beat the EPA's Energy Star guidelines.

Testing the systems in a worst-case scenario under Windows, we found that the ALR Flyer did the best job at watt-pinchin' in full power-saver mode, with both monitor and system drawing only 28 watts. The AST Brava turned down to 30 watts total and the Insight EcoSystem dropped to 36 watts.

But that's not the whole story. The AST Brava draws only 89 watts total in full-power mode, compared to 123 watts for the ALR Flyer and 131 watts for the Insight EcoSystem. In addition, the AST Brava can turn off the hard disk alone and operate at 55 watts for much of the time, compared to 103 watts on the Insight EcoSystem.

So which system is best? That depends on the way you use your PC. The average business user doesn't use a huge amount of power per year. And green PCs aren't dramatically different when it comes to power consumption.



The AST Brava features a minuscule 60-watt power supply, thanks to power-efficient circuitry.

A LOT OF very cool product ideas turn out to be a very slow burn—Windows, OS/2, and CD-ROM come to mind. But energy-efficient, or “green,” PCs are bound to take off overnight because they enable PC users to save the country millions of barrels of fossil fuel over time without incurring any extra cost or inconvenience.

Green PCs are just now hitting the streets, and unlike most new technology, they don't carry a price premium or sacrifice performance. Of course, if you buy the machines in volume, you'll add big. A kilowatt here and there adds up over time.

We looked at a trio of early-bird greens—the ALR Flyer VL, the AST Bravo LP, and the Insight EcoSystem. While they all come



The ALR Flyer (shown above) and the Insight EcoSystem were not winners in speed tests.

in the usual 486 processor flavors, we decided to focus on what are potentially the biggest power grabbers, those equipped with Intel's 486DX2/66. Each system boasts local-bus graphics with 1MB of video RAM and a 15- or 17-inch Super VGA display. Each is a true Windows performer—and the AST Bravo LP is a rocket.

Coolness without Compromise

One of the additional benefits of going green is that your system can use a smaller power supply that runs cooler. The Insight EcoSystem has a small 145-watt power supply, while the AST gets by with a tiny 60-watt supply thanks to power-efficient circuitry on the Bravo LP motherboard.

ALR outfitted its Flyer with a full 200-watt supply on the theory that many buyers still want the optional power.

A smaller power supply means more room in a cabinet size that is defined by the number and position of add-in cards. The ALR Flyer VL is only 3.7 inches high, while the AST Bravo LP is a pizza box at 15.5 by 14.5 by 3.25 inches. Both offer one internal and two external drive bays, plus two ISA

PC/COMPUTING LAB REPORT: POWER CONSUMPTION TEST



ALR FLYER/NANAO

The lower the wattage, the greater the savings.



AST BRAVO/ASTVISION



INSIGHT ECOSYSTEM/NANAO

Too Close to Call . . .

The average business user consumes \$30 of PC power in a year. With green PCs the average user would consume about \$15 per year.

World, Spare the Wallet



The Insight system, like ALR's, comes with a 17-inch energy-saving Nanao monitor.

slots. The Flyer sports another open VL-Bus slot, and it and the Bravo have a module for add-Ins. The 17.2-by-16.2-by-4.2-inch Insight EcoSystem provides four bays (three external) and three full-length ISA slots.

All have top-notch, local-bus Super VGA adapters on the motherboard (ALR and AST use VL-Bus), with the now-standard array of Bitblt-ing, hardware-cursor, and line-draw enhancements. Their 1MB of video memory displays 256 colors at 1,024-by-768-pixel resolution. Add another megabyte and you get photographic-quality 24-bit color.

The Big Energy-Savings Picture

Both the ALR and Insight systems are easy on the eyes, thanks to their 17-inch, 28-millimeter-dot-pitch, Nanao monitors—the source of most of their energy savings. The AST's 15-inch ASTVision monitor is still a cut above the 14-inch norm.

Most 486DX computers now run at 30 to 40 watts, while monitors draw 100 to 120 watts in full operation. Our tests found that the Nanao F550iW runs at about 100 watts under Windows. Three minutes of inactivity will send it into a 12-watt sleep mode from which it is still capable of instantly awakening at the touch of a key or the mouse. Deep sleep uses 6 to 8 watts but takes a bit longer to warm up. AST's 15-inch ASTVision 5L dropped to only about 26 watts in sleep mode in our tests. However,

even under Windows' full-power mode, it drew only 63 watts.

Monitors aside, both the ALR and the Insight rely on third-party BIOS's to take advantage of the power management built into Intel chip sets. AST writes its own BIOS and uses power-management technology developed for its notebooks. The ALR and Insight don't shut down unused subsystems in a user-selectable way. Only the AST can shut down the hard drive alone after a user-specified period of inactivity in Windows or DOS, offering power savings without a full "system" time-out.

The power you save depends on the number of hours a day you use your PC, and the percentage of time it goes into energy-saving mode. In any case, the savings are about \$15 a year per PC.

As for your own capital investment, an ALR Flyer VL 4/66d with 4MB of RAM, a 240MB IDE hard drive, and a 17-inch Nanao monitor sells for \$3,885. Insight's EcoSystem, similarly configured except for 128K of cache and a 340MB Western Digital drive, sells for \$3,299. An AST Bravo LP 4/66d with 64K of cache, 8MB of RAM, a 340MB hard drive, and a 15-inch ASTVision 5L sells for an estimated \$3,026.

Bottom line: You can get an energy-efficient system for the same price as a nongreen PC at any price point. **MIKE HOGAN**

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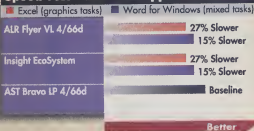
AST SPEEDS AHEAD

All of our energy-efficient PCs turned in top-flight performances in our Windows application tests compared to other 486DX2/66s we have tested, but the highly integrated AST Bravo LP 4/66d with 64K of cache turned out to be our all-time winner and outpaced the Insight EcoSystem (with 128K of cache) and the coacheless

PC/COMPUTING LAB REPORT:

AST'S BRAVO: THE ONE TO BEAT

Speed Test—Windows Apps



ALR Flyer VL 4/66d by a considerable margin.

The Bravo ran a graphics-intensive Excel test in 3 minutes and 6 seconds, significantly faster than the nearly identical performance of 4 minutes and 16 seconds for the EcoSystem and 4 minutes and 15 seconds for the Flyer.

The Bravo was again in the mixed-task Word for Windows editing test, completing it in 3 minutes and 13 seconds compared to the near-identical times of 3 minutes and 46 seconds for the EcoSystem and 3 minutes and 48 seconds for the Flyer.

Sick of Clunky Windows? HP's New Dashboard to the Rescue

MORE REAL ESTATE

Need space? It's simple to configure Dashboard to take up less screen space. Here, the virtual screens are reduced to miniature view, and launch and printer buttons have been reconfigured as tear-off toolbars. You also can eliminate the clock and system-resources fuel gauge to save even more screen space.

Dashboard's new tear-off toolbars break away from the main control panel and become



separate windows, allowing you to squeeze more items into a toolbar and make Dashboard smaller than ever.

Aside from its focus on space conservation, Dashboard doesn't include a whole lot of new tools. One of the product's strong points remains the onscreen system resource gauge seen in both screens here.

GO TO ANY computer trade show, throw a rock, and chances are you'll hit somebody selling a Windows program launcher or shell replacement. Amid this rolling mass, Hewlett-Packard's Dashboard 2.0 commands respect. While this well-polished jewel is by no means the most powerful Windows-enhancement utility, its elegant design and unique mix of features make it incredibly usable.

Smarter, Not Bigger

HP hasn't added any significant new tools to this upgrade, but it has refined Dashboard to make it more flexible and customizable, and to consume less screen space—a problem in Version 1.0. Dashboard's main control panel still centers around three main elements: folders containing the contents of your Program Manager groups, and individual toolbars for launching applications and switching and configuring printers. Fax modem users who frequently switch between their regular printer driver and fax software driver will find this last feature indispensable.

Dashboard's other big drawing card is virtual desktops, which HP calls extended screens. Similar to PC Tools for Windows' desktops, extended screens provide discrete screen space for different applications, which avoids confusing clutter. Because virtual screens encourage you to keep many applications open, HP has thoughtfully included an onscreen "fuel gauge" for system resources in Dashboard—and it's the only virtual desktop program we've seen that does. If you have too many applications loaded concurrently, this feature keeps you from finding out the hard way.

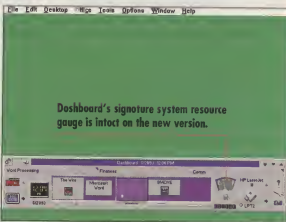
We were especially impressed with Dashboard's new snap-off toolbars for three key elements: quick-launch buttons, printer buttons, and Program Manager group folders. When you click on icons for those items, they snap off from the control panel into separate windows. The primary benefit

is that you can include more items in the snap-off toolbars than you could comfortably fit on the control panel.

You also can now display Dashboard either vertically or horizontally—a feature noticeably missing in the first version.

Where's the Kitchen Sink?

While Dashboard is undeniably elegant and useful, some users will want more power in a Windows front end than Dashboard musters. Dashboard doesn't support multiple onscreen button bars for program launching, for instance—a staple feature of



With all options showing, Dashboard appears like a simple control panel including quick-launch buttons for your applications and virtual desktops with discrete screen space for different applications.

other program launchers, including hDC Power Launcher (which also outranks Dashboard in macro-development savvy).

A minor gripe: While Dashboard uses Program Manager groups to create folders, it can't read in groups from Norton Desktop for Windows or PC Tools for Windows.

But Dashboard is an enduring hit because of its finesse, not its power. While most program launchers and shells are unrelated conglomerations of capabilities, Dashboard is a cohesive little jewel.

DAVID HASKIN

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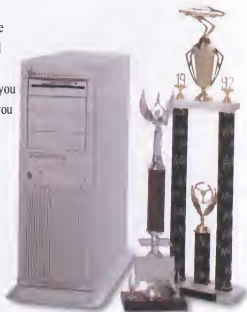
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Virtus's Incredible Walkthrough: Virtual-Reality-Based Drawing

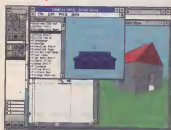
WALK ON THROUGH

Sydney Pollock used it to set up scenes and camera shots in the blockbuster film *The Firm*. Brian De Palma used it to design the underwater set for *Corlita's*



Way, and Tom Clancy, author of *The Hunt for Red October*, liked the program so much he bought part of the company. Walkthrough for Windows, from startup Virtus, is like no other draw program.

The Design view (left window of above screen) includes basic tools for drawing boxes and other polygons. As objects are drawn in the Design view, they're rendered in 3-D space in the Walk view shown



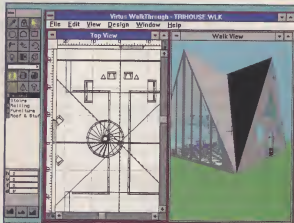
on the right of all three screens. By clicking and panning with your mouse in the Walk view, you can move up, down, forward, backward, around, or inside any object you've drawn.

IMAGINE BEING ABLE to draw a box, a building, or an entire floor plan—and then “walking through,” or exploring, what you’ve drawn from any angle in 3-D space. No, this isn’t a description of what you can do with a \$25,000 Unix-based graphics workstation. It’s Walkthrough for Windows, a glitzy new 3D drawing and visualization program from Virtus.

For a program with roots in 3-D CAD, Walkthrough is surprisingly easy to use. To create a 3-D drawing, you use Walkthrough’s two “views.” In a window on the left of the screen is the Design view—a 2-D grid with

At first, “walking” in 3-D space is disorienting; move too fast and you’ll get lost, or you’ll get a case of the spins. Once you get the hang of it, though, touring your drawings is a trip.

You can record your path and replay it—even after you’ve changed the layout in the Design view. You can save your “walks” to Autodesk Animator Pro format to drop them into multimedia presentations and animation sequences. You can save perspectives of the Walk view in several graphics formats (TIFF, EPS, Illustrator) and read models created in other 3-D packages via the 3-D DXF format.



Walkthrough for Windows is an eclectic and advanced application that borrows features and design concepts from CAD, drawing tools, and even virtual reality to create realistic 3-D models.

drawing tools for creating boxes, spheres, and free-form polygons. As you would with conventional drawing programs, you select different tools to create different shapes. When you draw shapes in the Design view, they’re automatically extruded into 3-D objects that appear in a window on the right called the Walk view.

It’s in the Walk view that things get really interesting. Pan with your mouse, and you can navigate and explore anything you’ve drawn in the Design view from any perspective. Move up, down, forward, backward, over, around, or inside any object you’ve drawn by simply clicking and dragging with the mouse.

Despite the clean and simple interface, Walkthrough’s drawing tools are quite sophisticated. Not only can you control the measurements of drawings with CAD-like accuracy, but the entire program is object-oriented. Draw a box, and you can edit each surface of the box individually. Change the clarity of a surface or object, and it appears translucent for a glass-like effect.

Object libraries filled with furniture, plants, people, and other shapes are included with the program, as are sample models and virtual landscapes.

One caution: Walkthrough is quite fast at 3-D rendering, but

it demands a lot of horsepower. Forget about running it on a 386. Ideally, you’ll want a fast 486 with a lot of memory and a speedy video card—particularly for large, complex models.

Engineers, product designers, artists, and even your average user will find Walkthrough for Windows a breakthrough design tool. Walkthrough’s 3-D rendering tools are amazingly realistic—start building models and you’re guaranteed to get hooked.

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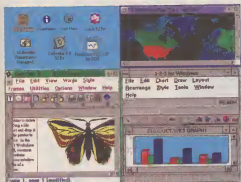
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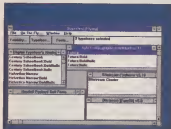


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Printer Queue Blues? SuperPrint Wins Back Control of Your PC

SUPER SMART

SuperText, which is bundled with SuperPrint, puts all your screen fonts in one place. Windows applications support TrueType screen fonts automatically, but SuperText allows applications to display Intellifont, Adobe Type Manager, Facelift, and FontWare fonts concurrently with TrueType. SuperText



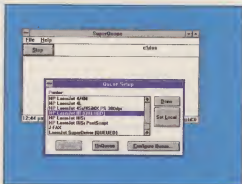
loads automatically when you start Windows, and we found its centralized management of screen fonts to be a big efficiency boost. To see SuperText's screen fonts, simply select the Zenographics SuperDriver for your printer. SuperDrivers can be assigned to SuperQueue just like regular printer drivers for faster job spooling. If you're tired of waiting for your application to send print jobs to the Windows Print Manager, SuperPrint's SuperQueue can reduce that time by half.

TIRED OF DRUMMING your fingers waiting for Windows Print Manager to spool your print jobs? SuperPrint from Zenographics spools jobs faster than Print Manager, letting you get right back to work.

Print Manager spools print data to disk and transfers it to the printer in the background so you can keep working. But Print Manager is notoriously poky—while it's at work, the cursor slows, and switching applications takes forever, even on fast PCs.

SuperPrint replaces the Windows Print Manager with SuperQueue. Simply disable Print Manager from Windows' Control Panel and attach your printer driver to SuperQueue. In our tests printing to an HP LaserJet III, it returned keyboard and cursor control 50 percent faster for Word for Windows documents (a 10-page letter and a 7-page report) and seven times faster for our PowerPoint presentation. Moreover, keyboard and cursor control was snappy.

You also can use SuperPrint to print to network printers and local parallel-port connections using included SuperDrivers. The drivers include support for HP's LaserJet, DeskJet, and PaintJet; Canon BubbleJet



SuperQueue won't speed up printing, but it spools print jobs faster than Windows Print Manager does, letting you use your computer again sooner.

and laser printers; and all dot matrix printers.

SuperPrint won't speed printing. In fact, a print spooler adds to your overall print time. But when you don't have time to waste waiting for your computer, SuperPrint fills the bill.

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Quick Restart has a single function: It serves as an electronic bookmark to return you to exactly where you were when you last worked on your computer, whether in Windows or DOS. It has only one command: A hotkey calls up a screen that informs you of



Quick Restart analyzes your system configuration in order to restart intelligently—and more quickly.

a data-save process and then tells you when it is safe to power down.

At power up, you are immediately returned to your last keystroke. Startup times will vary by machine, but a system

that usually takes minutes to load drivers, configuration files, and Windows can start up in about 35 seconds. People who turn their machine off and on a lot will find that Quick Restart saves lots of time.

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With Stacker, you can get the most from your hard drive. And with OS/2 on it, you can get the most from your computer. To order or to find out more about OS/2 2.1 or Stacker for OS/2 & DOS, call 1 800 3-IBM-OS2. In Canada, call 1 800 465-7999.

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With Stacker, doubling the capacity of your hard disk is as easy as pie.

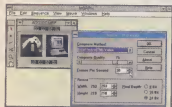
Morph Creates the Slickest Presentation Effects Ever

EXTEND MORPH CLIPS
It's limitless. The basic Morph transformation sequence moves from a starting image to a second closing image, but it's possible to add sequences



indefinitely. In each two-step sequence you add, use the image that closed the previous sequence as the starting point for the next so that there's no awkward transition between sequences. Add the new closing image, and then build up your key points in the usual way. The problem? You have to reset the key points on the new sequence's starting image—and that's a pain.

This technique of using an



intermediate step is handy for making smooth transitions between two very different items. It's perhaps even more useful as a way to "morph" on object back into its starting image so that you can run the clip continuously.

THINK YOU'VE SEEN it all? If you build presentations, Morph, Gryphon Software's \$169 graphics transformation software, will impress even the most jaded viewer.

Picture a video clip that melts one face into another, or that transforms an image of an obsolete product into your latest offering. Now picture these effects in a presentation. Morph offers all this and more—you don't have to be an expert to make the movie clip. Take two TIFF, PCX, or other graphics files, highlight some key areas—called *key points*—on each image, set a duration for the clip, and save your movie.

Morph saves clips in the Video for Windows AVI format. You can augment them with sound using regular WAV files and plug them directly into presentations. Morph comes with a runtime version of Microsoft Video for Windows that lets you embed AVI clips into any software that acts as an OLE client.

Smooth Transitions

To get a clean transformation in your AVI clip, you have to place a sufficient number of key points in your graphics—a tedious and time-consuming, though not difficult, process. First, using the Key Point tool, click a key point on the first picture; a corresponding dot then appears in the second picture. Next, use the pointer tool to move the second key point to the appropriate place in the second picture. The rub: You have to repeat this procedure dozens of times.

To define the image's edges, click on the movable toolbar's Line tool and draw lines between key points—a kind of digital connect-the-dots—until you've linked all the relevant dots. Repeat this process for the second image. Now you're ready to save the movie—a process that took you ten minutes on a fast 486.

Morph provides a choice of frame rates to accommodate different output systems. The default of 5 frames per second

works fine on a regular Windows system. You can scale your video clips up to and beyond 30 frames per second.

File-Compression Caveats

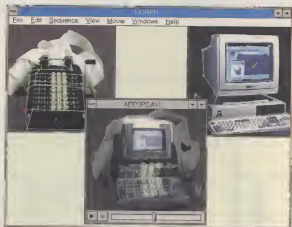
There are drawbacks. You must start with crisp, high-quality graphics because the available file-compression techniques, Microsoft Video 1 and Intel Indeo, degrade the images' color depth and sharpness. This isn't Morph's fault.

Sometimes the tools you use get in the way of the process: Lining up key points is a laborious process that involves changing tools nearly every second. Morph forces you to think about how to do the task instead of what needs to be done. Other morphing programs coming down the pike, including Digital Morph from HSC Software, may well streamline these tasks.

These are minor quibbles considering the simplicity of the process, however. With a few practice tries, you can wow an audience with the video clips you create. And given the battery of special effects that movie and TV audiences see every day, that's no mean feat.

MATTHEW LAKE

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Using two ordinary graphics files, Gryphon Software's Morph creates a Windows-based video clip that mutates the image of an adding machine, shown above, into the image of a computer.



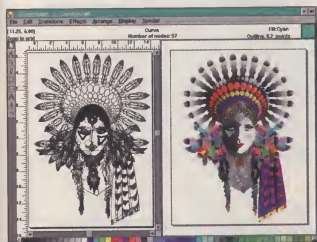
This

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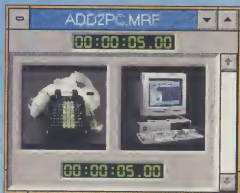
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GUIDED TOUR

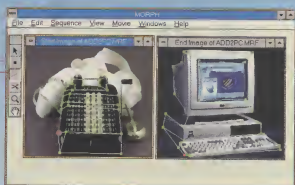
MTV Meets the PC: Morph Transitions Use Movie-Making Conventions

Gryphon Software's Morph transforms one regular graphics file into another and then saves the transformation in a Windows video clip. The result? A Windows-based presentation with eye-popping special effects that will wow even an audience that thinks it's seen it all.

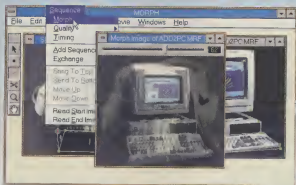


1. In a new Morph file, you first set the duration of the video clip you want to build, then double-click on both windows to select the graphics. One caveat: Once you select a starting image, Morph only lets you select a closing image with the same dimensions.

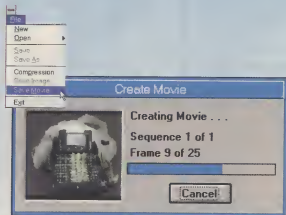
Key Point tool



2. Use the Key Point tool to draw a dot at a key point in the starting image. A corresponding dot will then appear in the closing image. Use the Painter tool to move that dot to the appropriate place. Add dots at will, then join them with the Line tool.



3. Select Sequence, Morph to generate the halfway point in the transformation of the starting and closing images. To view the image, select Windows, Morph Image. To get more context, move the Morph image to another paint and re-morph the sequence.



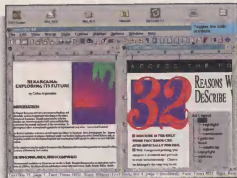
4. If all looks well, select File, Save Movie to create an AVI file that you can play in your presentation program. This operation is the most time-consuming part of the process. To be on the safe side, budget at least 10 minutes for each 5-second clip.

Mere

Superlatives would be much more fitting. Awesome comes to mind. Powerful. And then there's innovative.

PC Magazine had these words to say about DeScribe® Word Processor 4.0 for OS/2™—"It...performs amazing acrobatic feats of editing and display that leave rival programs gasping in envy."

words



DeScribe's 32-bit design lets you get every last bit of power from OS/2.

DeScribe

PC Week wasn't exactly at a loss for words either. They said DeScribe "sets the standard for OS/2 applications by taking excellent advantage of the operating system's advanced features."

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Darkroom on Disk: Picture Publisher 4.0 Beats PhotoShop

FLOATING OBJECTS

Our favorite addition to Picture Publisher: The program treats images or parts of images as independent floating objects—ideal for composite



photography work and eye-catching image effects. For the screen above we cropped part of an image and copied it to another file, where it behaves as a floating bit-mapped object. A visual object manager (at the far right of the screen) shows which objects are open and active.

A new feature called FastBits (bottom screen)



solves some of the speed problems associated with 24-bit image editing by letting you load and edit only a small section of an image at a time, which is very efficient.

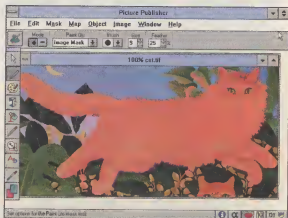
YOU CAN'T REST in the software business. Right on the heels of Adobe's much-heralded release of PhotoShop for Windows, Micrografx has cooked up a new version of its own popular 24-bit image-editing program, Picture Publisher 4.0. The results go beyond any image editor anywhere. Not only does Version 4.0 add new filters and masking techniques for refining and contorting color and grayscale images, but it also breaks new ground. Innovative features such as object layering, macro recording, and the ability to load selected portions of an image into memory give it an edge over the competition—even PhotoShop and Aldus's PhotoStyler.

The most impressive part: Picture Publisher 4.0 treats images or their parts as independent floating objects—ideal for creating composite photographs and MTV-style effects. Crop a person or another part of an image, and it's treated as a floating bit-mapped object. Copy it to a background, and you can move, rotate, layer, and apply effects to it without affecting the background or other objects. Objects aren't locked in place and merged until you save them as a single bit-mapped file. A visual object manager shows which objects are open; in addition, you can save objects to a separate file and reuse them. Currently only Fractal Design's Fractal Painter handles such sophisticated object-oriented editing. Also new to Version 4.0 are improved masking features. You can now paint a mask with a paintbrush tool—great for cropping complex shapes made up of several colors.

A common gripe about Picture Publisher 3.1 was its lackluster performance, but Version 4.0 is remarkably snappy. An effects browser lets you preview special-effects filters before applying them to an image. And a feature called FastBits lets you load and edit only a small section of an image at a time—a process that's much quicker than trying to manipulate an entire image at

once. Open an image at a low resolution (50 pixels per inch, for example), and Picture Publisher lets you experiment on it before applying changes to the full-size image—a notable omission in PhotoShop.

Working with text is simplified in Version 4.0; you can type and edit text directly onto the image. Once entered, text behaves as an object that can be flipped, moved, and even edited onscreen. Micrografx has added several new photo-retouching effects,



Micrografx Picture Publisher 4.0 adds filters and masking techniques, and offers innovative features like object layering. For the screen above, we easily pointed on a mask.

including dodge and burn (a popular PhotoShop effect), and a few natural-media paint styles (à la Fractal Painter) including chalk, charcoal, and crayon textures.

Fortunately, none of Picture Publisher 4.0's enhancements come at the expense of its accessibility. And the effects browser, the FastBits feature, and the object-editing and low-resolution-object capabilities are features that you won't find in PhotoShop, PhotoStyler, or most other image-editing packages. At \$595 (compared to \$895 for PhotoShop and \$795 for PhotoStyler), Picture Publisher even outpaces its competition.

WENDY TAYLOR

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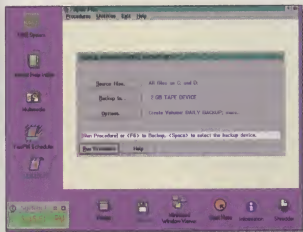


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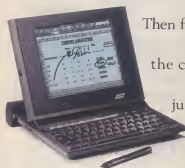
of Sytron Plus stands alone, its benefits can extend across OS/2 networking environments, including IBM LAN Server.

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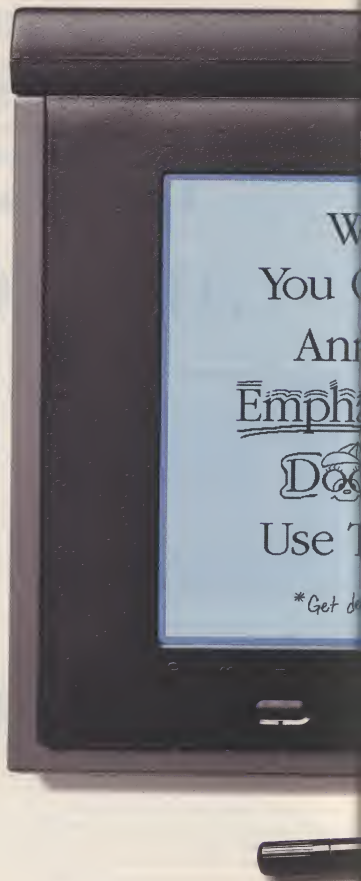


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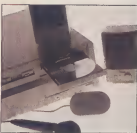


Entertainment or Work? Cheap IBM Multimedia Systems Do Both

DIFFERENT SOLUTIONS

IBM's new machines come in different flavors. The range of Multimedia Value Point (MVP) bundles are divided into three groups—Office, Reference, and Entertainment Solutions—each of which comes with a range of processors and storage capacities.

For serious multimedia, we recommend nothing less than a



486/33; the MVP offerings are available with 486/66 processors. The bare-bones Office Solutions package sports a SoundBlaster card and an internal double-speed, XA-ready CD-ROM drive that exceeded the MPC Level 2 data-transfer requirement several times over in our tests.

The other products in the series build on this basic model with speakers and a microphone, a Kodak PhotoCD starter kit, presentation graphics in the form of HSC InterActive, Software Toolworks' Encyclopedia, and Microsoft's Bookshelf and Multimedia Works for Windows CDs. IBM's Entertainment Solutions adds games from Broderbund.

READY TO DIVE into CD-ROM-spinning, sound-blasting multimedia? But not ready to spend a fortune? One of the best sources of inexpensive multimedia machines is also one of the most unlikely—IBM. The latest models in IBM's PS/ValuePoint line throw in everything you need for a starter multimedia system: sound, a CD-ROM drive, and a thick stack of CD titles.

Like any hardware series, the IBM Multimedia PS/ValuePoints (MVPs) present you with a wide selection of configurations; but even the humblest offering meets the requirements for Multimedia PC Level 2 (MPC Level 2) compliance: a 120MB hard disk, 4MB of RAM, a 486SX 25MHz processor, 16-bit sound, and a double-speed CD-ROM drive that handles multisession Kodak PhotoCD.

For serious multimedia users, the disk space and memory in the MPC Level 2 spec are pitifully inadequate, but the MVP series contains well-configured systems (486SX/33, 8MB of RAM, 340MB hard drive) complete with a high-quality microphone and speakers, and sundry CD-ROM titles, all for around \$3,000—a bargain.

Sound and Vision

In spite of IBM's recent foray into sound card manufacturing, the MVP series uses SoundBlaster 16-bit cards. This hardware, coupled with Creative Labs' excellent speakers and hand-held microphone, produced excellent sound in our tests. Creative Labs' sound software for both recording and text-to-speech conversion



A word to the wise: Fargo the standard 14-inch display that comes with IBM's MVP machines. It is capable of only 800-by-600 resolution.

round out the sound options nicely.

The MVP's S3-based local-bus video exceeds expectations for an MPC Level 2 system and performed well in our Windows application tests. One megabyte of VRAM, capable of 24-bit color below 800-by-600-pixel resolution, delivered the graphical goods, but the standard monitor failed to do justice to the onboard video.

The standard 14-inch display was capable of only 800-by-600 resolution at a 60MHz refresh rate—which for serious multimedia applications is too small a monitor and too low a resolution. Of course, you can always mix-and-match displays with these systems, but the standard monitor is still a weak link in an otherwise strong basic setup.

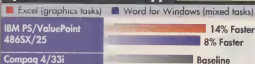
The system that we tested was a very good deal, it was easier to set up than an MPC upgrade kit, and it sounded great. We recommend choosing your own brand of monitor, but otherwise, IBM's multimedia PCs are real winners, for both work and entertainment.

MATTHEW LAKE

PC/COMPUTING LAB REPORT:

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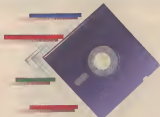
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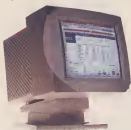
For more information on the communications software that *Windows User* called "absolutely brilliant," phone 1-800-93-HAYES. In Canada, call 1-800-665-1259. **Hayes[®]** Why settle for anything less? Hayes products have the computer world talking. More than ever. Circle 162 on reader service card.



Portrait Display's Pivoting Monitor Turns in a Flash

SWEET DEAL

Get a new perspective on your Windows documents. Wouldn't you like different views on



your documents, as seen in the two photos here? The Portrait 15/Plus is the only monitor that displays documents in both landscape and full-page portrait modes without requiring a special video adapter. If you're looking for a fast, high-res video cord to accompany the monitor, Portrait bundles an Orchid Fehrenheit 1280 Windows accelerator—which we've found in tests to be very fast—for an additional \$199.

FUNNY THAT MOST monitors work like TVs instead of the 8½-by-11-inch sheets of paper they're meant to emulate. It's as if you were meant to watch your monitor, rather than work on it. Not so with the Portrait/15 Plus from Portrait Display Labs.

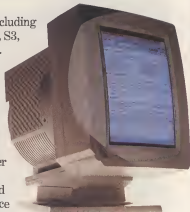
Portrait's 15-inch multifrequency monitor lets you view documents in portrait or landscape mode by flipping the monitor on its side. You can display spreadsheets or horizontally arranged documents in traditional landscape mode, then rotate the screen 90 degrees to portrait orientation for full-page documents. A keystroke reorients the image when you turn the monitor.

The only other monitor with this talent is Radius's \$1,149 15-inch Pivot monitor, but it requires Radius's proprietary video board to rotate, whereas Portrait's display works with your existing adapter. Pivoting is handled by a WinPortrait software driver that syncs to 800-by-600 and 1,024-by-768 resolutions under Windows. You can't pivot in 640-by-480 VGA mode, however, and DOS applications run on the monitor only in landscape mode (or in a DOS window in portrait mode). The WinPortrait driver works with most video

chip sets, including Tseng, ATI, S3, and Video 7.

Image quality on the 0.28-millimeter-dot-pitch Portrait/15 Plus rivals that of better 15-inch displays, and the \$799 price (if you order directly from Portrait) is competitive.

But keep in mind: The monitor pivots only in Windows and displays only 256 colors. And the lack of support for 24-bit color in portrait mode is a liability for desktop publishing. **WENDY TAYLOR**



The Portrait/15 Plus is a cheap deal at \$799, but you can only rotate the screen in Windows.

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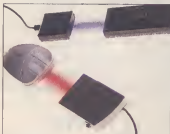
New Mice Slash the Ever-Annoying Umbilical Cord to Your PC

FEELING CHAINED to your computer? Two slick new wireless devices from Mind Path Technologies and Logitech will untether you. The \$395 Mind Path IR90 infrared remote-control device (top right in photo) enhances your Windows presentations as a mouse/pointer combo. It contains ten customizable function buttons and dedicated Enter, Menu, Pause, and Esc keys. Care to highlight a specific item in a list? All you have to do is press the Spotlight button, and an infrared pointer, called a *telestrator*, turns you into John Madden.

Logitech's \$149 MouseMan Cordless is the ultimate cordless mouse. It uses radio frequencies instead of infrared technology to

ensure mice signals reach the mouse's receiver (bottom right in photo). However, radio wave interference may still be an issue. Logitech claims it has a range of 6 feet from the receiver, but our tests found its range limited to 3 feet on a crowded desk.

With an ergonomic design we've come to expect from Logitech and an affordable price to boot, the MouseMan Cordless's benefits win out. Both products beat a standard mouse. **CHRIS SANDLUND**



New wireless mice free you up: Mind Path's IR90 (top) and Logitech's Mouseman (bottom).

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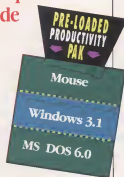


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CAT Portable Scanners: No-Slot or Notebook Solutions on a Budget

SERIOUS SCANNING

Your parallel-port scanning options are expanding. Hand scanners are increasingly becoming viable as portable devices, and you make far fewer compromises with parallel-port scanners than you'd think. CAT's introduction of a parallel-port adapter in the last decade paved the way for some serious competition. This year has seen three powerful players, all of which are compliant with the Windows-based TWAIN standard.

The \$799 Niscan Page supports fax-modem transfers—a big plus for serious scanning use. Its rechargeable NiCad batteries fit in the body of the scanner, so there are fewer parts than in CAT's offering. (For a review of the Niscan Page, see *News*, July, page 72.)

Logitech's ScanMan EasyTouch matches the CAT hand-scanning system in features, but its TWAIN compliance and use of industry-standard software—namely the Windows-based OmniPage Direct from Caere Corp.—makes it an attractive proposition. (The OmniPage Direct offers extremely accurate OCR.)

And Mustek will soon be adding a color model to its parallel-scanning line, which includes the PrinScan 105.

COMPUTER AIDED TECHNOLOGY introduced no-slot hand scanning technology five years ago with its CAT Hand ScanAdapter LPT. Since then, only the details have changed. The two notebook scanners it currently ships stand out only because they plug into the parallel port—otherwise, they are just a generic Omron 8½-inch scanner and a 4-inch hand-held model bundled with CAT's DOS-based OCR and paint programs.

These low-cost scanners have three things in their favor: price, portability, and modest system requirements. At \$599, the CAT Portable Page Scanning System is cheaper than its competition, Niscan's \$799 Niscan Page. And the \$299 CAT Hand Scanning System for Notebook PCs scans in true grayscale information, unlike its competition, Mustek's black-and-white \$299 PrinScan 105.

DOS-Based Grays

In both packages, you get scanners capable of reading in 256 shades of gray at 400 dots per inch, a parallel-port adapter complete with power supply or rechargeable battery pack, and basic image-editing and trainable OCR software. The installation routine

is a breeze. And the package's elements worked at full capacity on our humblest test bed: a 286 with 1MB of memory and an EGA graphics adapter.

Hardware Isn't Everything

The hardware did its job, in particular the 4-inch hand scanner, which includes two gripping rubber rollers to minimize skewing. Unfortunately, the software didn't work very well—on any test platform.

The OCR software, CAT Reader 2, is trainable, which means that you can scan a document and type in the characters the program highlights to teach the software a typeface. This laborious process would be worthwhile if the resulting accuracy were on a par with more modern omnifont OCR software. But too often in our tests, the program failed to match the accuracy of other hand-scanner OCR software such as OCRon's Perceive Personal.

CAT Image Enhancer 256, the image-editing software that supports the Hand Scanning System, covers such basics as image stitching (using a striped calibration sheet), adjusting contrast, and creating

halftones for cleaner printing.

Between the two programs, though, images can be saved in only two formats, uncompressed TIFF and PCX. The Portable Page Scanning System is better served by its CAT Image Studio software, which has more editing tools.

Despite the software's limitations, improvements may be just around the corner. The company is working on TWAIN-compliant scanning software, which will give CAT's hardware direct access to a host of worthier OCR and image-editing software. When this happens, near the end of 1993, the hardware's price and portability will look more attractive.

MATTHEW LAKE



If you want to hook up a scanner to a DOS-based notebook or PC with no free expansion slots, Computer Aided Technology offers two portable—and attractively priced—solutions.

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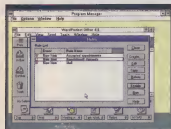


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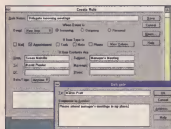
WordPerfect's Integrated Office Package Is E-Mail and More

PLAYING BY THE RULES
It's easy to organize your mailbox with the highly configurable, rules-based message-management system in WordPerfect Office 4.0. You



can store, run, enable, and disable rules with a mouse click (top screen).

You can do more than just move messages between folders—you also can create rules that will automatically act on incoming items. For example, in the screen below, we defined a rule that delegates an incoming meeting request to another user and even sends a message to that



user explaining the task.

Overall, we found Office's rules easier to work with than any other product's.

WITH THE RELEASE of Version 4.0 of Office, WordPerfect has finally dragged and dropped its suite of integrated applications into the Windows world. Office 4.0 takes full advantage of its graphical environment, turning what was a serviceable assortment of programs into an integrated application that goes beyond mail and scheduling, and into the world of work-flow automation.

Unlike in earlier versions, all of the Office 4.0 programs share a common interface. They are so well meshed, it's easier to think of them as a feature set rather than as integrated applications. In addition to the half-dozen feature icons, including Mail and Scheduler, the Office shell also includes in-boxes and out-boxes and a movable button bar of basic functions. There is also a Shelf, which is a window with icons representing frequently used views (a monthly calendar, for example, or a list of unopened mail messages) as well as any executable file.

You create messages, meeting requests, and task assignments using variations of the basic Mail form. An Address button calls up a list of users, making it easy to click on a name and drag it to the appropriate field (To, CC, BCC). You can attach documents and add voice annotations to any message.

The Schedule and Assign Task forms offer variations on the Mail form. When scheduling a meeting, you add participants, which can include resources like a conference room, in the same way you would address a mail message. Then you can click on the Busy button at the bottom of the form to view everyone's schedule. Inexplicably, the program won't find a free time slot for you automatically—a standard feature in most group schedulers we've seen. However, it's a forgivable oversight given the other sophisticated Schedule features such as auto-dating for setting recurring appointments. The Assign Task form adds a Priority field and Start and Due dates to the basic mail form. You can also create a routing slip that

sends the message and any attached documents to each addressee, allowing them to make changes or add comments before sending the task message on.

Incoming messages, meeting requests, and tasks are sent to a user's in-box, and all outgoing items to the out-box. Users can organize mailboxes into hierarchical folders to store items. There is also Proxy support, which lets another user access your in-box and calendar—handy if you have assistants.

One slick tool Office provides is flexible rules-based message management that lets the system automatically act on a number of events—for instance, routing all meeting requests to a specified person. While this isn't the first system to use filters and triggers to manage a mailbox, it's the first that makes rules easy. This feature alone makes Office worth the price of admission.

While earlier releases of WordPerfect Office may have had many of the same features as Version 4.0, the improved interface makes all the difference—this program is now one of the best examples of truly integrated software.

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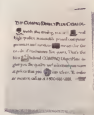
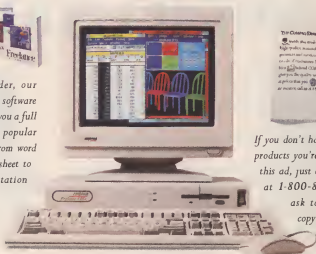


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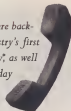
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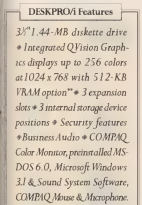


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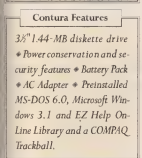
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*Quicken for
Windows*

This entry-level system gives you a full range of business and personal applications as well as data and fax communications—all at a surprisingly low price.

\$1,599
Or \$57 per month*
Save over \$228!

*Leasing is provided by GE Capital Corporation for a term of 36 months, and is subject to approved credit and certain terms and conditions. Call for details. †Savings based on individual prices.

SPECIAL SOLUTIONS BECAUSE IN THE END, YOU'LL SAVE.

The Front Office.



COMPAQ ProLinea 4/33
33-MHz 486DX, 4-MB RAM,
120-MB hard drive,
SVGA Color Monitor.



Quattro Pro
for Windows



WordPerfect
for Windows

This general business solution, which is offered to you at a very competitive price, teams up two popular word processing and spreadsheet applications.

\$1,899

Or \$68 per month*
Save over \$274*

The Windows Office.



COMPAQ DESKPRO 4/33i
33-MHz 486DX, 4-MB RAM,
240-MB hard drive,
1024 Color Monitor.



Extra 2-MB
of RAM



The Microsoft
Office
for Windows

This solution can utilize COMPAQ business audio with the most popular Microsoft applications. The Microsoft Office includes Microsoft Excel, Word, PowerPoint and Mail.

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Or \$97 per month*
Save over \$239*

The Office Pro.



COMPAQ ProLinea 4/50
50-MHz 486DX2, 4-MB RAM,
240-MB hard drive,
SVGA Color Monitor.



Extra 4-MB
of RAM



14.4 Kbps
Data+Fax
Modem



WinFax PRO
for Windows



Lotus
SmartSuite
for Windows

This solution offers data and fax communications with popular Lotus applications. Lotus SmartSuite includes Lotus 1-2-3, AmiPro, Freelance Graphics, Organizer and cc:Mail.

\$2,899

Or \$104 per month*
Save over \$279*



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Circle 243 on reader service card.

Rules to Manage By: ManagePro Tracks Employees and Goals

MORE THAN A simple personal information manager and less than a full-fledged project-management package, Avantos's ManagePro 2.0 is *almost* the ideal tool for an overworked manager. Based on the idea that the best way to manage people is to set clear goals and follow up with regular feedback and recognition, the \$395 ManagePro provides a highly organized framework for helping a manager do both. One caveat: While ManagePro does its job well, this structured approach isn't for everyone.

The program's real strength—and its unique feature—is its ability to organize your management responsibilities. The software even tells you the right way to do your job: It comes with a handbook called *Managing People*, as well as an online Management Advisor that has tips on everything from task delegation to salary planning to employee development.

The People Planner looks very much like the Goal Planner, except that it allows for more progress and planning detail. Each person is defined by title and reporting relationship to the manager (Direct Report, Skip-Level Report, Peer, Consultant, and so on), and you can define teams from the existing list of users. The People Planner also lets you add basic employee information including hire date, previous job, current

and planned salary, and address. More important, it gives you an organized way to track each employee's progress and monitor your own commitments to provide them with feedback, reviews, rewards, and recognition.

You can configure ManagePro to remind you of your scheduled management duties, such as entering interim progress data or conducting a formal review. The People Status view gives you a color-coded view of the status of each employee's goals as well as your own progress in managing each individual. If you miss a review, for example, the appropriate box will be red (or whatever color you define to indicate a critical status); double-click on that box and ManagePro will display all the relevant details.

ManagePro prods you to attend to your management duties in several ways. The Action List pulls out every item with a due date associated with it from the Goal and People Planners and all to-do lists, giving you a comprehensive list of all upcoming tasks—both yours and those of your employees. The user-configurable Assistant, new in this release, offers a more selective overview of upcoming tasks, although it does make the Action List somewhat redundant.

Our only gripe with ManagePro is that for a program that emphasizes manager-employee interaction, it could have more communication features. Avantos has tried to improve ManagePro as a "home base" for managers by adding some calendar features and support for e-mail (for VIM and MAPI-compliant systems) and DDE. But you must look elsewhere for conveniences like integrated group scheduling, task routing, and delegation. Still, while it may not be the total manager's solution, ManagePro is the only hope for the boss who's overworked.

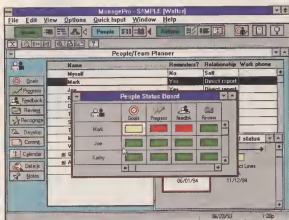
SHYAMALA REDDY

SHARED ACCESS

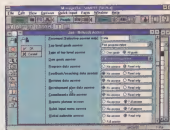
ManagePro gets network-friendly—and it's intelligent at the same time. When you create a new database,



ManagePro asks you to specify whether the database will be unrestricted, fully restricted, or selectively restricted (see top screen). If you choose the latter, you then use the dialog box shown in the bottom screen to grant individual users different levels of access to almost every aspect of your Goal and People Planners. While the multiuser support and security are excellent, we'd still like



ManagePro's interface lets you quickly access goal status information for any employee simply by clicking on the appropriate box in the People Status Board, shown above.



to see a more hierarchical approach, which would allow several managers to share a single database. Avantos says it's working on this feature for a future release.

MANAGEPRO 2.0, \$395, NETWORK MODULE, \$99 • AVANTOS PERFORMANCE SYSTEMS • (510) 654-4600
Circle No. 623 on Reader Service Card

With JetWay/P, Printer Sharing Isn't Just for Networks

SNAPPY SOLUTION

You want easy? The whole point of ASP's JetWay/P is ultrasimple printer sharing. While the JetWay/P doesn't require that you make any configuration changes, you may want to set the time-out length on the Snap connectors. (Snap connectors attach to each PC you want to have share a printer, and they transmit signals over telephone-type cabling to the shared printer.) The time-out length affects not only the PC's control over its Snap chain but also its control over the JetWay/P, since both remain allocated to that PC until its job times out. You can boost the 5-second default to 20, 60, or 140 seconds if users need to print complex graphics files.

Thanks to the JetWay/P's simultaneous buffering of its ports, the only way that you'll know you're not connected directly to the printer is if you're on a Snap chain and someone else is sending a job to the printer. In that case, your PC will get a "Printer Busy" signal.

FORGET ABOUT LANs. Forget about workgroup printers. If your networking needs are limited to printer sharing, the ASP JetWay/P can turn a regular parallel printer into a shared device within minutes. Simply attach the JetWay/P to your regular parallel printer and run cables to the PC's parallel ports, and you have a fast, functional alternative to a full-blown network.

Instead of parallel cabling, the JetWay/P uses ASP's Snap transmitters, which attach to each PC. They convert parallel signals to high-speed proprietary serial signals and send them over phone-type RJ-11 cabling, extending the 50-foot parallel-cable limit to 850 feet with little performance loss. You can daisy-chain 20 Snap transmitter-equipped PCs on each JetWay/P port.

The JetWay/P has 256K of buffer RAM, upgradable to 4MB. Because the JetWay/P uses a standard parallel-printer port and always operates at full speed, it needs no PC-based software. It took us about five minutes to install the JetWay/P, Snap transmitter, and connecting cables, and then to run a self-test.



By combining the JetWay/P with ASP's Snap connectors and attaching it to your printer, you can connect up to 20 users per port to a single printer.

The JetWay/P isn't cheap—the four-port model is \$345, and a Snap connector is \$59—but it's an easy, smart solution. **PHILIP F. H. ROSE**

JETWAY/P JWP421 (FOUR PORTS), \$345, JETWAY/P JWP821 (EIGHT PORTS), \$545 • ASP COMPUTER PRODUCTS • (800) 445-6190
Circle No. 624 on Reader Service Card

BSE Plug-In Converter Makes Serial Ports Parallel—But Not Faster

LET'S FACE IT: One parallel port isn't enough—and having no parallel ports is unthinkable. The proliferation of parallel peripherals makes big demands on your notebook's limited port offerings—so instead of swapping cables, try a \$79.95 solution from the world of palmtops. BSE's Parallel Port (actually designed for the HP 95 LX palmtop) increases the parallel-port capacity on any PC with a spare serial port.

This tiny 2½-inch device does more than change pin configurations. Taking its power from the serial port, it converts serial signals to Centronics parallel. You can connect a parallel printer to the serial port, say, leaving your real parallel port free.

Just two cautions: Don't use the converter for anything requiring true parallel speed. We found that the serial-port bottleneck

slowed the signal so much that printing crawled. And the converter won't work with parallel-only devices such as Xircom network adapters, which have software drivers written for parallel-port communications.

Nevertheless, the BSE Parallel Port offers a simple way to break a seemingly impenetrable connectivity barrier. That ability and its modest price overshadow its speed limitation.

JEFF GREENBERG



BSE plug-in converter

PARALLEL PORT, \$79.95 • BSE CO. • (602) 522-8843
Circle No. 625 on Reader Service Card



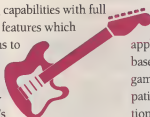
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Looking for the ultimate in multimedia sound? Then take a look at what we have up our sleeves. Introducing MediaMagic, a family of Digital Signal Processor (DSP) audio boards and sound systems that bring superior concert-hall sound to your PC.

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|------------------------|---------------|-----------|------------|-------------|-----------------------|
| MediaMagic DSP-16 Plus | 16-bit 48 KHz | Yes | Standard | SCSI | Yes (encoder/decoder) |
| Sound Blaster 16 ASP | 16-bit 44 KHz | Yes | Optional | Proprietary | No |
| ProAudio Spectrum -16 | 16-bit 44 KHz | No | No | No | No |



Circle 113 on reader service card.

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It's Show Time

Movies on your PC monitor? It certainly isn't the big screen, but a whole raft of companies are offering upgrade cards that let you capture, edit, and play full-motion video from a TV, VCR, live camera, or other NTSC sources.

Among the most recent new add-in boards is Sigma Designs' **WinMovie**, which captures video that can be merged and edited using the bundled Microsoft Video for Windows to create unique Audio Video Interleave (AVI) files that can be played back at up to 30 frames per second for desktop presentations, training, or education. WinMovie supports true-color resolutions of 16.7 million colors at 640-by-480-pixel resolution. Sigma also bundles King Technology's Picture Prowler image-database manager. (\$299; Sigma Designs; 800-845-8086)

Circle Reader Service No. 637

For a few dollars more, Videologic offers its **Captivator** video-capture and playback board. You get the same range of resolutions as in WinMovie and a free copy of Video for Windows for creating and managing AVI film clips. But you also get Macromedia Action presentation software and its own still-frame-capture application called VideoSnap. (\$399; Videologic; 800-578-5644)

Circle Reader Service No. 638

Finally, from In-Motion comes **Picture Perfect**, a product that lets you use more computer memory and more video memory to produce full-screen, true-color film clips at a full 30 frames per second at resolutions of up to 1,024 by 768 pixels. Picture Perfect offers darkroom effects, more flexible zooming, and 1-to-15 lossless JPEG compression of still files and Motion JPEG compression of AVI files. In-Motion will bundle Lenel's Multimedia Works multimedia player, which plays all types of multimedia files, including video, graphics, sound, and animation. (\$449; In-Motion; 510-651-2626)

Circle Reader Service No. 639

THE LATEST UPGRADES TO PRODUCTS YOU USE

BY MIKE HOGAN

Access 1.1

Microsoft has improved its relational database manager's ability to connect to corporate databases, as well as its interoperability with other Microsoft applications. Access 1.1 reads and writes to Oracle and Sybase SQL databases, and more easily imports Excel database ranges and fixed-width text and exports into Word for Windows mail-merge. The maximum file size also has been expanded from 128MB to 1GB. (\$495, \$15 for upgrades; Microsoft Corp.; 206-882-8080)

Circle No. 626 on Reader Service Card

WinFax Pro for Networks

This network fax server offers the same functionality as Delrina's market-leading WinFax Pro 3.0 at a low entry price for a two-user software license. Easily upgraded to support an unlimited number of users and up to 16 fax modems, WinFax Pro for Networks supports more than 300 brands of fax modems as well as Novell NetWare, Artisoft LANtastic,

and Microsoft Windows for Workgroups. Its features include extensive fax viewing, annotation, and management capabilities, as well as OCR. (\$399 for a two-user license; Delrina Corp.; 800-268-6082)

Circle Reader Service No. 627

WordPerfect ExpressDocs

This set of 40 custom templates lets you quickly create a variety of document types using WordPerfect 5.2 for Windows. Developed by LaserTools Corporation and shipping in specially marked packages of WordPerfect 5.2 for Windows, ExpressDocs includes customizable templates for documents including memos, fax cover sheets, newsletters, résumés, form letters, and invoices. In addition, a new button bar in WordPerfect includes options

for drop caps, watermarks, and page borders. (WordPerfect 5.2 for Windows, \$495; ExpressDocs sells separately for \$49.95; WordPerfect Corp.; 800-321-4566)

Circle No. 628 on Reader Service Card

FaxWorks Pro 3.0

FaxWorks Pro 3.0's fax management includes the abilities to create cover-sheet templates and several kinds of fax logs, assign extended filenames to faxes, and search with several parameters. You can examine faxes using full-screen, two-per-screen, or multiple-thumbnail views. There also are advanced drawing and annotation tools. (\$129.99; SofNet; 404-984-8088)

Circle No. 629 on Reader Service Card

SPSS 6.0 for Windows

Version 6.0 of this Windows statistical-data-analysis program features expanded data connectivity and twice as many chart types for analyzing data sets, including Pareto charts,



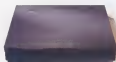
Windows Goes Green with Nanao

Nanao's new Flexscan F550iW 17-inch color monitor automatically powers down to an energy-efficient standby mode that uses only 12 watts—10 percent of its normal power—after 3 minutes of nonuse. This flat-panel display with a .28-millimeter dot pitch also will put itself into a deep sleep, using 8.4 watts after a user-defined period of nonuse. (\$1,599; Nanao USA Corp.; 310-325-5202)

Circle No. 635 on Reader Service Card

 **It sits,
lies down,
and does
back
flips.**

Good b



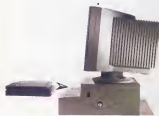
The most flexible screen
ever seen.



It opens flat
up to 180°



Or flips
around in just
seconds.



There's even a
Docking Station™
unit for full
desktop
computing



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*The UltraLite® Versa™ notebook
gives new meaning to the term
"faithful companion."*

Versa functions as a pen-
based tablet to enter
notes or data



The reversible screen
makes presentations
a snap

The UltraLite Versa is truly a breed apart. It's versatile and adapts easily to meet your changing needs, whatever and wherever. For example, switch from a mono to color screen, or put in more hard-drive memory. And despite its heavy-duty technology, the Versa weighs as little as 6 pounds.

Then there's the most sophisticated and flexible display on the market. Use it as a basic notebook, flip it around for presentations, or use it as a pen-based tablet. Plus, Versa's screen provides sharp contrast and brilliant graphics, monochrome or color.

With up to 10 hours of battery life, the one thing it won't do is play dead.


Yes, the Versa notebook knows a lot of tricks. Its i486™SL processor is fast and powerful, yet conserves power. Simply swap the floppy drive for an extra battery, doubling battery life.

And what's a notebook computer if you can't take it for long walks? Advanced PCMCIA communications capability means you can easily send and receive faxes and retrieve data.

We'll even come when we're called.

In addition to a standard 3-year limited warranty, you get UltraCare™, an enhanced, full-service program providing fast response and support anytime, anywhere, at home or overseas.*

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Because  is the way you want to go.

NEC

Communications Features



Using thin, credit-card-sized cards, you can send and receive faxes, talk to your network, or ensure secure data storage. And for advanced, real-time mobile communications, Versa is even ready for wireless and cellular connectivity and also incorporates the newest PCMCIA technology.

- Accommodates two Type II cards or one Type III card
- Simultaneous card capability: data/fax modem, LAN, storage
- QuickSwap™ compatibility, for features such as changing cards without powering down



The UltraLite Versa is the first of a new series of computer products from NEC designed to work together with enhanced functionality and advanced ergonomics.

With the UltraLite Versa you can choose your own best friend.

Features/Options



Versa's many standard and optional features provide exceptional upgradability and flexibility, to give you the power to choose the system you need today and then enhance its features as your needs change.

Battery

- DoubleTime™ technology, for increased battery power
- Long-life NiMH battery pack: 2.5 to 5 hours (color) and 4 to 5 hours (mono)
- Optional secondary battery for a total of 5 to 10 hours (color) and 8 to 12 hours (mono)

Storage and memory

- Choice of 120MB, 180MB, or 250MB easily removable hard drives, no tools required
- Slide-in memory cards, for upgradability from 4MB all the way to 20MB**

Processor

- i486SX processor, 25MHz or 33MHz
- Built-in numeric coprocessor and 8KB cache
- Screen
- High-speed local bus video and desktop-level 640 X 480 display
- NEC-upgradeable to pen capability** mono or color
- Standard 9" 4" STN active Super VGA monochrome screen, with 64 shades of gray
- Optional 9" 4" TFT active-matrix Super VGA color screen, with wide-angle viewing and 256-color display out of a possible 226,000

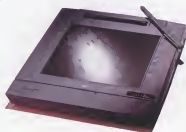
Docking Station

- 2 full-sized ISA slots, for expandability
- 3 drive bays, 2 external 5.25" and 1 internal 3.5"
- Integrated microphone and headphone ports

Pointing Device

- Custom Beigpoint™ mouse standard

VersaPad



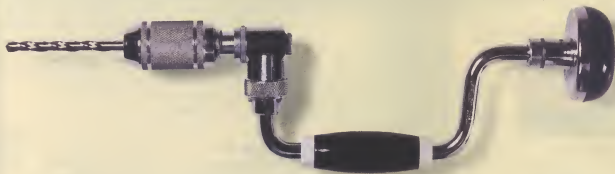
NEC's new VersaPad™, the ideal platform for corporate pen computing. Perfect for data collection and transmission needs, including inventory control, sales force automation and merchandising.

- Full-function i486SX portable tablet computer
- Slim 4-pound design with VGA transreflective screen for clear indoor/outdoor viewing
- 2 PCMCIA Type II slots, for flexible communications and storage
- NiMH battery options and advanced power management, for long battery life
- Available with all major pen computing environments, including Windows for Pen Computing™ and PenPost™ software



NEC

WinFax Pro should be scared to bits,



because FaxWorks Pro is faster.



Introducing FaxWorks Pro 3.0. A faster and more productive way to manage faxes from your PC.

For starters, FaxWorks' unique Modem Diagnostics instantly identifies and configures your fax modem, so you're up and running immediately.

Convert faxes to editable text with OCR. Rotate and zoom at blazing speed. And instantly enhance any document for crystal clarity.

Fax Works Pro has faster image manipulation. And that means you work faster. Drag and drop thumbnails to easily assemble faxes. Add notes using the unique floating toolbox. Use Cover Sheet Creator to add logos, clip art and even your own signature to professional looking cover sheets. You can even create faxes with documents from different applications, without leaving the program.

And with FaxTracker®, the premier fax management tool, you can manage all your faxes quickly and efficiently from one window. Search

and retrieve by extended name, keyword or send/receive logs. File, compress and assemble faxes. And use MiniView to inspect fax documents without opening them.

It's no wonder the competition is scared.

FaxWorks Pro is pure power. At a price that's well within reach. And if you've already bought another brand by accident, we'll forgive you for only \$49.

Just call 1-800-FAXWORKS, or see your local dealer.



(404) 984-8088. LAN, OS/2 and DOS versions also available.

SOFTNET

Circle 246 on reader service card.

FaxWorks is a trademark and FaxTracker is a registered trademark of SoftNet, Inc. All other products are trademarks or registered trademarks of their respective manufacturers.

Short Takes

Dell's ReadyWare software

Installation program now includes the installation of network interface cards. Eight types of ethernet and token-ring protocol cards are available for between \$69 and \$699. The charge for installation is \$15 per system regardless of the number of cards installed. (\$69 to \$699; Dell Computer; 800-289-3355)

Circle Reader Service No. 640

CorelDraw 3.0's price has been reduced to \$199 to make room for CorelDraw 4.0 (\$595). CorelDraw 3.0 is now marketed as Corel's entry-level graphics package, while Version 4.0 takes the spot at the high end. CorelDraw 4.0 has multiple pages, up to 999 pages for desktop layout, an editor with free-flowing text, and an animation package. Is 3.0 a stripped-down, not-worth-owning imitation of the new version? Not on your life—it's more powerful than you'd expect for a year-old package. (\$199 for Version 3.0, \$595 for Version 4.0; Corel Corp.; 800-836-3729, 613-728-3733)

Circle Reader Service No. 641

AST Research LocalMotion

drivers are now being bundled with the company's line of Premia PCs. This will enable you to enlarge your Video for Windows images from 160-by-120-pixel resolution to full-screen size without sacrificing smoothness in video motion or synchronization with audio during multimedia, sales-presentation, and training applications. In addition, AST includes a Video for Windows runtime version with each one of its Windows 3.11-equipped models. Current owners of Premia PCs can download the drivers either from AST's customer bulletin board or by contacting the company directly. (Free; AST Research; 800-876-4278, 714-727-4141)

Circle Reader Service No. 642

cross-correlation-function plots, and 11 different curve-fitting methods. New features enable users to work better with enterprisewide data or data in other applications. In addition, there are 58 new statistical functions and expanded regression capabilities. (\$695, \$149 for upgrades; SPSS; 800-543-9262, 312-329-2400)

Circle No. 630 on Reader Service Card

Compton's Interactive Encyclopedia 2.0

The latest version of Compton's CD-ROM encyclopedia includes a browser, which lets the reader quickly see a web of small scrollable windows with articles related to the selected topic. Also new is an expandable and collapsible world history timeline that's directly linked to video clips, sound, pictures, and articles. Context-sensitive help is more accessible and the pictures and animation are of a higher quality than in previous releases. (\$395; Compton's NewMedia; 800-862-2206, 619-929-2500)

Circle Reader Service No. 631

**OnTime, Version 1.5
For Windows, Version 2.5
For DOS**

OnTime now supports the import and export of its appointment information to and from a variety of palmtop devices including the Hewlett-Packard 95LX and 100LX, Sharp Wizard, Casio Boss and Psion. The program also supports wireless communications software that transmits messages to alphanumeric pagers. Printing options in both versions have been expanded to include calendar printout styles similar to those of popular day planners; you also have the option of printing only selected entries. (\$129.95, \$356 for a three-user network license; Campbell Services; 800-345-6747)

Circle No. 632 on Reader Service Card

BusinessWorks 8.0

Small-business managers can track their departmental budgets more closely and get a quick scan of their company's health by using the new financial ratios found in Version 8.0 of Manzanita's BusinessWorks. A number of other usability features are sprinkled throughout the program's accounts-payable, accounts-receivable, inventory-control, payroll, and order-entry modules, including the ability to calculate the cost of assembled components before a product is built. The price of standalone modules has jumped \$100 to \$395, but a bundle that includes the \$95 System Manager with general ledger, accounts receivable, and accounts payable sells for \$795. (Manzanita Software Systems; 800-447-5700, 916-781-3880)

Circle No. 633 on Reader Service Card

The Print Shop Deluxe 1.2

Desktop designers take note: Version 1.2 of this popular desktop publishing program is up to three times faster than previous versions, and it now automatically previews fonts and text effects onscreen. Both the import and the export formats have been expanded to include such page-layout essentials as EPS, PCX, and TIFF files, among others. (\$79.95; Broderbund Software; 800-423-9999)

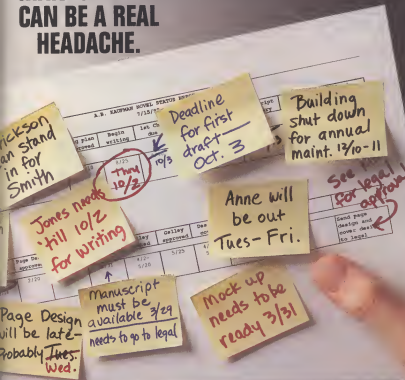
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**El Fish**

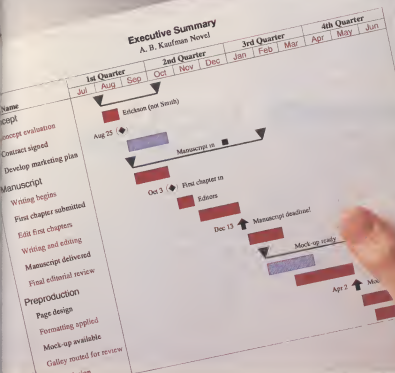
This animator lets you create millions of exotic fish species through cross-breeding. You can then convert captured files into wallpaper. (\$59.99; Maxis; 510-254-9700)

Circle No. 636 on Reader Service Card

ON ONE HAND, PROJECT MANAGEMENT CAN BE A REAL HEADACHE.



ON THE OTHER HAND, WHY SHOULD IT BE?



You work hard enough planning your projects; why not let Microsoft® Project 3.0 for Windows® help you make it easier?

With clear graphs, you'll be able to see and communicate your project even better—from the tiny details to the big picture.

Changes? No problem. For every revision you make, Microsoft Project helps you see how it will affect the entire job.

Assigning a new job? Just click the People button. Want to know who's doing what, when? Microsoft Project can help you keep track of everyone.

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PCContact

Get a Copy of Top-Notch Personal Information Manager—Free!

Looking for a top-notch but low-cost Windows personal information manager (PIM)? Then you'll love this impossible-to-beat deal: You can get a free copy of Desktop Set Jr., a Windows PIM that includes a phone book, calendar, and dialer. This program is a scaled-down version of Okna Corporation's Desktop Set PIM. Download the free copy of Desktop Set Jr. from *PC/Computing's* online service, PC/Contact.



Just look for filename DTSTJR.ZIP in data library 3 (Utilities/Misc.).

If you find you like the junior version enough to take the plunge and upgrade to the full-fledged program, you can get Desktop Set 4.0 PIM for \$89 from Okna. Contact the company at P.O. Box 522, Lyndhurst, NJ 07071, or call (800) 765-5570.

Circle Reader Service No. 643

Free Disk Checker for DOS 6.0 Users

If reports of DOS 6.0 damaging hard disk data worry you—especially if you use the DoubleSpace disk-compression utility—here's a no-cost solution: Touchstone Software is offering a free license for Checkit Pro's CKMEDIA utility to all DOS 6.0 users. The utility verifies the integrity of hard disk data, even when DoubleSpace is used. Contact Touchstone Software at (714) 969-7746 for details.

Circle No. 645 on Reader Service Card

BEST SOFTWARE BUYS

Where can you get the best software deal? Usually through the mail. We surveyed mail-order houses and came up with the best prices we could find. The following prices include shipping and handling charges but not credit-card surcharges. Prices are as of press time and are subject to change.

| PRODUCT | LIST PRICE | BEST PRICE | SOURCE | READER SERVICE NO. |
|-------------------------|------------|------------|---|--------------------|
| DOS 6.0 upgrade | \$99.95 | \$49.99 | CompUSA, (800) 272-2843 | 647 |
| Excel 4.0 | \$495.00 | \$299.00 | Loma, (800) 369-2846 | 648 |
| Lotus 1-2-3 3.4 | \$595.00 | \$399.00 | Egghead, (800) 344-4323 | 649 |
| Microsoft Word 5.5 | \$450.00 | \$209.00 | Microwarehouse, (800) 367-7080 | 650 |
| Norton Utilities 7.0 | \$179.00 | \$110.00 | Software Add-Ons, (800) 695-8088 | 651 |
| QEMM-386 | \$99.95 | \$61.00 | Loma, (800) 369-2846 | 652 |
| Quattro Pro 4.0 | \$495.00 | \$99.00 | Loma, (800) 369-2846 | 653 |
| Windows 3.1 | \$149.00 | \$99.00 | Duxini, (800) 477-3878 | 654 |
| Word for Windows 2.0 | \$495.00 | \$298.00 | Software Add-Ons, (800) 695-8088; or Loma, (800) 369-2846 | 655 |
| WordPerfect 6.0 | \$495.00 | \$279.99 | ET ValueLine, (800) 395-1000 | 656 |
| WordPerfect for Windows | \$495.00 | \$249.99 | ET ValueLine, (800) 395-1000 | 657 |

Cut-Rate Price on New Easy-to-Use Version of Microsoft Publisher

Version 2.0 of Microsoft Publisher is finally out (see New! August, page 44), and if you move fast enough, you can get it for \$60 less than its usual price. This desktop publishing program doesn't have the bells and whistles of a powerhouse such as QuarkXpress or PageMaker, but it's much easier to use and has a much smaller price tag. Purchase it before September 30, and the list price is \$139; after that the price goes back up to \$199. Until the end of September, you can get Publisher's Design Pack—which includes extra headline fonts, clip art, templates, and a copy of Microsoft Draw—for \$49.95 instead of \$69.95. The Design Pack is a must-have if you want to get the most from Publisher. Version 2.0 of Publisher adds a slew of features, including troubleshooting help, better text handling and file filters, and the ability to create special text effects for TrueType fonts. It's not the most powerful desktop publishing package, but it's extremely easy to use. Call Microsoft at (800) 426-9400 for details. Circle No. 644 on Reader Service Card

Great Deal on Network/Database Bundle from Alpha

If you're interested in buying a small network and topping it off with an accessible database solution, here's a great deal: For \$899 you can get a copy of a three-user LANtastic peer-to-peer network—including all software and hardware—as well as a three-user edition of the Alpha Four database. If you buy the network and database separately, you'll pay \$1,276. The bundle is called the Complete Solution and is especially good for small businesses. Call Alpha Software at (617) 229-2924 for details.

Circle No. 646 on Reader Service Card

SpaceManager™ finishes the job that MS-DOS® 6 DoubleSpace starts!



We didn't share all our space secrets with Microsoft. We held back on 6 of our crown jewels that'll make your life a lot easier.

- ❖ **SuperCompress™**—SpaceManager packs DoubleSpace compressed files tighter to give you up to 40% more available space on your hard disk, diskettes and removable storage media.
- ❖ **SelectCompress™**—Because some files don't compress well, and some applications take forever to perform operations on compressed data, SpaceManager gives you total control over the compression process. Just select the files you want to compress and the level of compression. SpaceManager then automatically optimizes system performance by eliminating unnecessary processing time spent on compressed data.

SpaceManager is certified safe for use with MS-DOS® 6.



Look what they're saying about SpaceManager!

"SpaceManager operates seamlessly with DoubleSpace."

InfoWorld, July 12, 1993

"Data Compression help...SpaceManager augments DoubleSpace."

Byte, July 1993

"SpaceManager, a product providing the viewing capabilities, downward MS-DOS compatibility and removable media support missing from DoubleSpace."

Computer Sources, July 1993

Why do you need SpaceManager?

How about better compression rates, improved system performance, and more control over the compression process? SpaceManager works in perfect tandem with MS-DOS® 6 and Windows to enhance the function and power of DoubleSpace. Team SpaceManager with MS-DOS® 6 and you'll have...

Your best disk space buy anywhere.

Dollar for dollar, SpaceManager is unbeatable. You'll pay about 25¢ for each and every MB you add to your disk capacity. Imagine! That's only \$5 for 20 MBs of extra disk space.

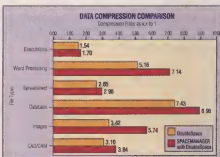
Sizzling disk performance.

You won't sacrifice even a millisecond of disk access speed with SpaceManager. It's like giving your disk drive a tune-up at a speed shop. Whomp!

Developed by the people who licensed the technology to Microsoft® for use in MS-DOS® 6 DoubleSpace.

No need to worry about compatibility problems with MS-DOS® 6 DoubleSpace. Vertisoft is the pioneer of on-the-fly disk compression for the PC—as well as the licensor of the

DoubleSpace technology, so we know all the deep-down important secrets. That's why SpaceManager is so fast and so powerful.

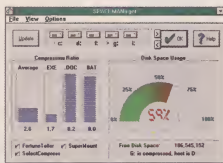


❖ **SuperMount™**—Accessing data from removable media—floppies, Syquest®, Bernoulli® or Floptical®—is automatic. You never stop your work to issue time consuming mount commands. Simply insert the media, compressed or not, and use it immediately from DOS, Windows, or any application.

❖ **SuperExchange™**—Load, access, read and write to DoubleSpace data on any system running DOS 3.3 or later. Any files saved to your compressed disks—even by someone who doesn't have MS-DOS® 6—are automatically compressed.

❖ **SpaceMonitor™**—One easy-to-read screen gives you all the information you need about both compressed and uncompressed drives.

❖ **FortuneTeller™**—While other compression programs assume all files compress at the same ratio, SpaceManager bases its space estimates on the specific type of file you're compressing.



Easy-to-read rainbow and bar graphs show your disk space usage and compression ratios for any type of file you specify.

SPECIAL INTRODUCTORY OFFER. PAY ONLY \$39⁹⁵. SAVE \$\$\$!

System Requirements

- 286, 386, 486 or Pentium IBM PC compatible.
- Hard disk drive with 640KB or more of memory (2MB of extended memory suggested)
- MS-DOS® 6 with DoubleSpace installed on system.
- SelectCompress and SuperCompress require at least 2MB of extended memory

FREE 30-DAY TRIAL!

Try SpaceManager free for 30 days. Simply pay the \$9⁹⁵ shipping & handling charge with a major credit card. If you aren't thrilled by its amazing powers, just return it and you'll owe nothing more. But if you find SpaceManager indispensable—keep it—and pay a limited time price of \$39⁹⁵. Don't let this one-time offer pass you by!

Call, now for your free copy!

1-800-456-6118 ext. 109



VERTISOFT SYSTEMS, INC.

The company that licensed the data compression technology to Microsoft® for inclusion in MS-DOS® 6 DoubleSpace.

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153-B Grace Drive, Easley, SC 29640
(803) 295-5875 • FAX (803) 269-4719

Software Saleswire

Office for Windows holds the edge in the war of the product suites.

THE COMEBACK KID
Lotus 1-2-3 for Windows made a splash in July with a significantly improved new release that gives Excel and Quattro Pro a run for their money.

HOW IT STACKS UP
Stacker hangs on as a favorite disk dauber, despite the fact that top-seller MS-DOS 6.0 includes its own data-compression utility.

DOLLARS AND SENSE
Intuit's versions of Quicken make financial management and small-business accounting a snap; Version 6.0 is a must-have upgrade.

| BUSINESS APPLICATIONS | VENDOR | PRICE | COMMENTS | JUN | JUL |
|-----------------------------------|------------------|-------|---|-----|-----|
| Office for Windows | Microsoft | \$750 | Includes Excel, Word, Powerpoint, Mail. | 6 | 1 |
| WordPerfect 5.2 for Windows | WordPerfect | \$495 | Includes Grommatik 5. | 3 | 2 |
| WordPerfect 5.1 | WordPerfect | \$495 | Power functions include equation editor. | 1 | 3 |
| Excel for Windows | Microsoft | \$495 | A powerful, graphical number cruncher. | - | 4 |
| Improv for Windows | Lotus | \$495 | For dynamic, free-form spreadsheets. | 10 | 5 |
| Paradox for Windows | Borland | \$140 | An object-oriented, relational database. | 5 | 6 |
| Fox Pro for Windows | Microsoft | \$495 | Features object linking and embedding. | - | 7 |
| Lotus 1-2-3 for Windows | Lotus | \$495 | Has better presentation features. | - | 8 |
| Lotus 1-2-3 3.4 | Lotus | \$595 | SmartIcons make this faster and easier. | 9 | 9 |
| Access 1.1 for Windows | Microsoft | \$495 | A database that emphasizes connectivity. | 2 | 10 |
| UTILITIES | VENDOR | PRICE | COMMENTS | JUN | JUL |
| MS-DOS 6.0 | Microsoft | \$130 | The PC operating system of choice. | 1 | 1 |
| Windows 3.1 | Microsoft | \$149 | A Mac-like GUI to complement DOS. | 2 | 2 |
| After Dark for Windows | Berkeley Systems | \$50 | Flying toasters prevent phosphor burn-in. | 9 | 3 |
| QEMM-386 | Quarterdeck | \$100 | Makes more memory for your apps. | 3 | 4 |
| Norton Utilities 7.0 | Symantec | \$179 | Call on Disk Doctor to fix damaged files. | 4 | 5 |
| Windows for Workgroups | Microsoft | \$250 | This GUI shores files, apps, printers. | 10 | 6 |
| Energizer Bunny Screen Saver | PC Dynamics | \$25 | This just keeps going and going... | - | 7 |
| Stacker | Stac Electronics | \$149 | Uses compression to stretch a hard disk. | - | 8 |
| CA-Clipper | Computer Assoc. | \$795 | Application development tools for PCs. | - | 9 |
| Visual C++ | Microsoft | \$199 | Integrated tool set for Windows apps. | - | 10 |
| PERSONAL PRODUCTIVITY | VENDOR | PRICE | COMMENTS | JUN | JUL |
| Quicken 6.0 | Intuit | \$70 | Single-entry bookkeeping for everyone. | 1 | 1 |
| Quicken 2.0 for Windows | Intuit | \$70 | Organizes finances, assets, liabilities. | 6 | 2 |
| Print Shop Deluxe | Broderbund | \$80 | Snoozy graphics and fonts. | 2 | 3 |
| Money for Windows | Microsoft | \$70 | Another take on financial management. | - | 4 |
| Print Shop Deluxe for Windows | Broderbund | \$80 | Same ease of use as in DOS version. | - | 5 |
| QuickBooks | Intuit | \$140 | Small-business accounting automated. | - | 6 |
| Calendur Creator Plus | Spinnaker | \$60 | Create custom schedules and calendars. | 4 | 7 |
| Calendur Creator Plus for Windows | Spinnaker | \$60 | Build those calendars in Windows. | - | 8 |
| CompuServe Windows Kit | CompuServe | \$40 | Connect to the online world. | - | 9 |
| QuickPay | Intuit | \$60 | Manages Quicken payrolls. | 10 | 10 |

These software charts are compiled once each month by G. Meier, Inc., which gathers ranked-order sales information supplied by the following software industry sources: ABCO Distributors; American Software; Bobboes; CompuAdd; CompuUSA; Corporate Software; Dusty Discount Software; Electronic Arts; Distribution; Ingram/Micro; Kenfil; Merisel; Micro Warehouse; Multiple Zones; PC Connection; Soft Kat; Software, Etc.; Software Plus; Software Resource; Software Spectrum; and Waldensoftware. A weighting system is applied to each entry based on three factors: the entry's position in the individual chart, the power of the contributing source based on annual gross sales, and the relative strength of a source in a given category of software. All prices are suggested retail and are subject to change.

You challenged IBM to get with
the times. First we created the
PC Company. And now...

Introducing AMBRA. A new kind of standard doesn't equal average. *Speed* 66 MHz performance at 33 MHz prices.

AMBRA: Excellence and an entrepreneurial edge.

At AMBRA,[™] we're proud of our IBM[®] heritage. Practical about it, too. We tap worldwide sourcing and purchasing power to get the latest and leading technology at volume prices — and pass the savings along to you. We run our computers through comprehensive testing to ensure industry-standard compatibility. And take full advantage of IBM's

renowned service organization to offer the undisputed best in service and support.

On the other hand, we like our independence — and do business in our own new and nimble way. We move quickly and freely, building our computers not only with the best IBM technology, but that of other high-quality, industry-standard suppliers. We custom-configure to order — at no extra cost. From

slimlines to desktops to towers to notebooks, we're positioned to outmatch the competition, point-for-point on price/performance. And we're prepared to deliver. To your door. In just a few days.

Interested? We invite you to keep reading, then give us a call. We'll send you the complete details on AMBRA computers and the services we offer, including our 30-day, money-back guarantee.^{1,2}



company that's *fast* on its feet. Where
isn't synonymous with **EXPENSE**. We deliver
Prepped for **P**entium. Ready to *RUN*.

AMBRA

very
AN INDEPENDENT IBM SUBSIDIARY

We're raising
industry
standards by
giving you more.

Combining the resources of IBM with the responsiveness of an independent company, AMBRA provides you with immediate access to the latest technology.

If it's industry-standard, we've got it for you now. If it's coming soon, we're positioned to get it — from advanced video to the latest microprocessors.

We're committed to giving you more for your money. Like extra cache at no added cost. Accelerated local bus without accelerated prices. Pentium™ upgradeability without a premium.

Along with extra features, we believe in giving you extra flexibility. Each and every AMBRA model is custom-built to your exact specs. With no penalty in terms of time or expense.

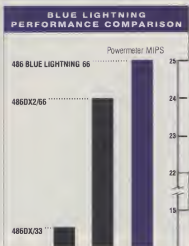
We offer hundreds of brand-name hardware, software and peripheral options — everything from Hayes® modems to Lexmark® printers. To make sure that every possibility is open to you.

All AMBRA computers carry a 30-day, money-back guarantee.^{1,2} They're backed by onsite IBM service and round-the-clock support — the kind of service and support that never lets you down.



**BLUE LIGHTNING: AN
ELECTRIFYING AMBRA
ADVANTAGE...**

IBM's 486 Blue Lightning™ processor builds on the best features of Intel microprocessors, including performance, instruction set and upgradeability. IBM optimized the instruction set, added a 16KB internal cache, lowered power consumption and improved power management. The result: Blue Lightning doubles internal clocking to 66 MHz, while maintaining full 486 compatibility. AMBRA harnesses the power of Blue Lightning to deliver 66 MHz system performance at 33 MHz prices.



All processors were tested on the same IBM motherboard.
MIPS = millions of instructions per second

Built to your order, exactly.

AMBRA will custom-configure any and every computer for you — and it won't cost you an extra day or an extra dime! You have your choice of chassis, processors and a full range of memory sizes. Hard and floppy disks, tape drives, CD-ROM drives, multimedia kits, and more. Plus high-quality, low-radiation AMBRA monitors, network cards, you name it. You get it all preinstalled, from a single source.

Preloaded software.

We automatically preload AMBRA computers with MS-DOS® 6.0 and Windows™ 3.1. Purchase any of our large collection of software, and we'll preload it for you at no additional installation charge.

True-blue service and support.

You're backed by a one-year, onsite warranty.¹ And you can count on 10,000 IBM technicians at 190 locations nationwide to deliver service within two days of your call, Monday through Saturday. Plus, you get toll-free support from IBM technical representatives 24 hours a day, 7 days a week.

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Fast, to-your-door delivery.

We ship within three days of confirmation of your order. If, for any reason, we can't meet that deadline, we'll tell you up front — and give you a firm delivery date.

1 - 8 0 0 -



66 MHz performance at 33 MHz prices.

With Blue Lightning AMBRA models, you reap the benefits of 66 MHz system performance — at 33 MHz prices.

| | AMBRA | GATEWAY | DELL |
|------------------------------------|--------------------------------|---------------------------------------|-----------------------|
| Model | 486 Blue Lightning 66 | 486DX-33V | 433L |
| Internal clock | 66 MHz | 33 MHz | 33 MHz |
| External clock | 33 MHz | 33 MHz | 33 MHz |
| System case | Desktop | Desktop | Desktop |
| RAM | 8MB | 8MB | 8MB |
| Cache | 256KB | 128KB | — |
| Floppy | One | One | One |
| Hard disk | 340MB | 340MB | 340MB |
| Onboard SCSI | ✓ | — | — |
| Local bus | ✓VESA | ✓VESA | ✓ |
| Video | Win accel w/1MB | Win accel w/1MB | Win accel w/512KB |
| Color monitor | 15" FST* | 15" FST | 15" FST |
| Pentium-ready | ✓ | ✓ | ✓ |
| DOS 6.0, Windows 3.1, mouse | ✓ | ✓MS Works for Windows | ✓ |
| Network-ready | Ethernet (10BaseT) | — | — |
| Tech support | 24 hours, 7 days/week from IBM | Mon-Fri, 8am to midnight Sat, 8am-4pm | 24 hours, 7 days/week |
| Warranty/Service | 1 year IBM onsite | 1 year onsite | 1 year onsite |
| Price | \$2,079 | \$2,025 | \$2,699 |

*Upgraded from 14" SVGA at no extra cost. See special offer.



Intel® Pentium, within your reach.

AMBRA is one of the few who can offer you Pentium today — and we offer it at a price you can afford.

| | AMBRA | DELL |
|------------------------------------|--------------------------------|-----------------------|
| Processor | Intel® Pentium 60 MHz | Intel® Pentium 60 MHz |
| | 64-bit proc complex | 64-bit proc complex |
| Bus type | EISA | EISA |
| System case | Desktop | Tower |
| RAM | 8MB | 8MB |
| Cache | 256KB | 256KB |
| Floppy | One | Two |
| Hard disk | 540MB SCSI | 500MB IDE |
| Onboard SCSI | ✓Dual 32-bit | — |
| Local bus | ✓VESA | ✓ |
| Video | ATI™ Ultra Pro w/2MB DRAM | Win accel w/512KB |
| Color monitor | 15" FST* | 15" FST |
| DOS 6.0, Windows 3.1, mouse | ✓ | ✓ |
| Tech support | 24 hours, 7 days/week from IBM | 24 hours, 7 days/week |
| Warranty/Service | 1 year IBM onsite | 1 year onsite |
| Price | \$4,259 | \$7,595 |

*Upgraded from 14" SVGA at no extra cost. See special offer.



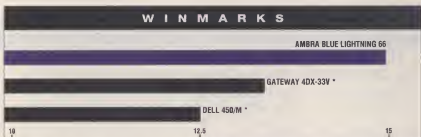
Solid products, hot prices.

Competitive prices shouldn't mean mediocre machines. Example: AMBRA's low-cost Model S425SX. It puts you in touch with tomorrow's innovations. That's because it's Pentium-ready — and supports memory upgrades to 36MB. It features the upgradeable 486SX 25 MHz processor; cache to spare, a fast local bus, and Windows accelerator with 1MB video memory.



Extra compact design. Extra color.

At 6.4 pounds, our 486SX 25 MHz SL-enhanced notebook packs a lot of performance. You get 4MB of expandable memory; a 120MB hard disk; STN dual-scan, passive-matrix screen for vibrant color and easy mouse tracking; plus integrated fax/modem and built-in trackball. All for \$2,449.



*Results measured in millions of Winmarks™ Reported in Window Sources (Ziff Davis), June 1993. Call AMBRA for specifics of this graphics Winmarks test.

25 AMBRA

AMBRA custom-building lets you cover all the bases.

HERE ARE JUST A FEW MODELS WE'LL MOLD TO MEET YOUR NEEDS:

Model S450SL

- 486SLC2, 50 MHz
- 4MB RAM max: 16MB
- 64KB processor cache
- 3.5" floppy
- 125MB (14ms) hard disk
- Windows accelerator with 1MB video memory
- 14" VGA color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$1,199

Model S425SX

- 486SX, 25 MHz
- Intel Pentium-ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 170MB (17ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- 14" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$1,339

Model S433DX

- 486DX, 33 MHz
- Intel Pentium-ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- 14" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$1,689

NC425 SL Notebook

- 486SX, 25 MHz, SL-enhanced
- Dual-scan STN color screen (640 x 480 x 256)
- Fax-modem 2400/9600 baud
- 4MB RAM max: 12MB
- 120MB hard disk
- 3.5" floppy
- 9.5" screen
- Integrated trackball
- 8.6" x 11.4" x 2.0", 6.4 lbs
- MS-DOS 6.0, Windows, MS Works for Windows

\$2,449

Model D466BL/CD

An AMBRA Best Buy!

- 486 Blue Lightning 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 440MB (12ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- CD-ROM drive and software
- Media Vision 16-bit sound card
- Stereo speakers
- 17" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$2,869

(For minitower, add \$50)

Model D466BL

- 486 Blue Lightning 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$1,979

(For minitower, add \$50)

Model D466DX

- 486DX2, 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 340MB hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- CD-ROM drive
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

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(For minitower, add \$50)

Model D466E/VL

- 486DX2, 66 MHz
- 64-bit Intel Pentium upgradeable
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 440MB IDE hard disk
- 2 VESA local bus slots
- 53 video accelerator with 1MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 32-bit available EISA slots
- MS-DOS 6.0, Windows, mouse

\$2,699

Model DP60E/VL

- ★ A Pentium Powerhouse!
- Intel Pentium processor, 60 MHz
- 64-bit processor complex
- VESA local bus with 1 available slot
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 540MB SCSI hard disk
- Onboard dual 32-bit Fast SCSI
- ATI Ultra Pro Mach 32, 2MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 available 32-bit EISA slots
- MS-DOS 6.0, Windows, mouse

\$4,259

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1. Warranty and 30-day guarantee information available through AMBRA. Please call 1-800-252-6272 for details regarding AMBRA's money-back guarantee and limited warranty. Copies of the terms of AMBRA's money-back guarantee are available upon request. One-year on-site service at no additional charge during warranty.

2. Return shipping and insurance charges are the responsibility of the customer.

In Canada, call 1-800-363-0066

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Offerings, prices and products are subject to change without prior notice. Prices do not include shipping.

Call 1-800-252-6272, Ext. 264

1-800-252-6272 AMBRA

The PowerPC: For Once A Non-Intel Chip Looks Like the Winner

THE GOOD NEWS: I SAW THE FUTURE AT COMDEX. THE BAD NEWS: The future comes in the form of a multiple-choice quiz.

First, there are chip futures: the Mips chip, the PowerPC, the Pentium, the Sparc, the Alpha, and a variety of rumored chips from Cyrix, AMD, and several Japanese companies. Second, there are operating systems futures: Novell DOS 7.0, MS-DOS 6.0, IBM DOS 6.1, Windows, Windows NT, OS/2 2.1, and Unix. Let's face it, the future looks like a Chinese restaurant take-out menu.

Before you try to pick winners, you're supposed to note that there are forces out there fighting change. In particular, the pundits say, there is the installed base of 100 million machines. Supposedly, this contingent demands that things don't change too radically. Too bad this is just a myth. It's actually the preoccupation with the installed base that prevents us from making correct assumptions about the future.

Know your history. Here's the best argument against the myth of the installed base as a reactionary force: how easily the user base is flocking from character-based applications to GUIs. Since the introduction of Windows 3.0, most of the sales activity in the computer world has been Windows related. Many companies are now giving up DOS applications and developing only GUI applications. So much for the installed base demanding that nothing ever change.

We first saw how fickle the installed base was when the user base dropped CP/M machines and flocked to the IBM PC in the early 1980s. The exodus was amazing. Back then people talked about the installed base like a god. All that has changed is that the installed base is bigger, which doesn't mean it's any less likely to suddenly flock to, say, the PowerPC platform.

It's this last platform that has the greatest possibilities. It's my pick. PowerPC systems cost half as much as the machines based on Intel's Pentium and they deliver the same performance. Floating-point performance is actually faster than the Pentium's. Furthermore, the manufacturers (IBM and Motorola) will sell the chip at half the price of the Pentium. If IBM adds some silicon that allows the PowerPC chip to process Pentium or merely 8086 instructions, it could bury Intel overnight.

Look at some of the interesting parallels from the last major platform change—in 1981—when the PC was introduced. The dominant microprocessor maker at the time was Zilog with its Z-80 family. Intel was in the middle of some serious blunders, including the 8085 and (later) the IAPX432, which arrived with a series of other would-be superchips, including a couple from Bell Labs. Just before the world discovered the IBM PC and the 8088, there was a chip battle not unlike the one we see today. Because Zilog was the hot ticket, all the bets were on the Z-80 as the chip

of choice for the move from 8-bit to 16-bit computing. The Z-80 got all the attention and cover stories. The Ithaca Audio Z-8000 and other machines appeared on the covers of the best magazines. Gee, what happened?

The same dead-end is possible for Pentium. The chip runs too hot and is too expensive to make. The other contenders in the RISC families—namely Sparc, Alpha, and Mips—are no more than proprietary CPUs, like the old innards of VAX machines or Data General minicomputers. Sun started the trend with the Sparc, which is used mostly in Sun workstations. Mips powers Silicon Graphics workstations and little else. And DEC couldn't be indebted to anybody else, so it developed Alpha. Bottom line: All the minicomputer makers have in-house designed CPUs. So what else is new?

Of course, the same argument can apply to the PowerPC because it's being built into the IBM RS/6000 workstation. Luckily, Apple is also using it for future Macintosh computers and other vendors see it as a potential winner for the next generation of PCs. I think the PowerPC will break out and become the general-purpose CPU of the next decade if it isn't stopped by the Intel-Microsoft junta.

I like choices. Are we fulfilled in a relationship that depends on Intel, Microsoft, and Novell for all of our computing needs? I can't say that I have a problem with the Intel platforms to date. But I jumped off the Microsoft bandwagon when I adopted OS/2, and I prefer to have a variety of vendors for my software. I have no grudge against Microsoft except that the company says it wants to dominate the software business. That means fewer choices. I like choices.

If I were to jump to a new platform based on the Chinese take-out menu outlined above, I'd choose the PowerPC chip running a variant of OS/2. I'm not a Unix buff, DOS is old, and Windows NT seems to be misfiring. OS/2 incorporates

The market will shift radically whether anyone tries to stop it or not.

Windows 3.1, so I get the best of both worlds—assuming the machine will somehow run old PC code.

Obviously, Microsoft and Intel (and all who subscribe to the Pentium-plus-NT-Uber Alles notions) will fight change if it affects them adversely. There are a lot more marketing heavyweights behind the existing platform than behind CP/M when the IBM PC took over. Expect a bloodbath.

The way to stop a platform change is to quash any possibility that change is plausible. This means emphasizing the installed base and old software, which marketing heavyweights will inevitably do. I'm betting that the market will shift radically whether anyone tries to stop it or not.

Whatever happens, I could use a few hundred MIPS on my desktop. ▀



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The Badder Things Get, the Better You Gotta Play Those Righteous Games

AN HOUR BEFORE MY A.M. MEETING, JUST GETTING IN A couple rounds of video poker. Losing, too. The phone rang.

"Can I ask you something?" whispered Armbruster, the vice president of business affairs. From his level of confidentiality, I thought he was going to tell me something about his wife. Or mine. "Do you play . . . Solitaire?" he murmured, and there was fear in his voice. He's a big dude, by the way, and not a thumbsucking goof-off. As by the way, neither am I. "I find myself coming in a half hour early," he said, "to get in a couple of rounds. It's very . . . entertaining, isn't it?" I could hear the naked need for reassurance oozing out of his squawkbox.

"I gave myself repetitive stress disorder playing Microsoft Solitaire," I replied. It was true. I blame nobody but myself for the diseased, hurtful affair I maintained through 1991 with Solitaire, the Ur-Windows game that has done so much to destroy the productive lives of empty-headed people everywhere. I recovered, but not everyone is quite that lucky.

The tragedy of substance abuse. Yes, for a period of six months, while having a first morning cup of coffee, then a second, or while waiting for a consultant to stop talking, or interviewing a twentysomething for a nonexistent job, I clicked my mouse so many times in pursuit of the message "You win!" that I finally couldn't lift my right arm higher than my ear. While this is not a critical problem for a vice president, I decided to take the entire WEP subdirectory out of my PATH statement and disable the icon. This means if I want to play, I have to launch it from File Manager. Who needs that?

I play games now. They don't play me.

Right before the big meeting, I got in a dozen holes of shareware golf at the legendary EGA St. Andrews course just outside Edinburgh. My companion was Beaver, the vice president of finance. "Can't be too happy about that one!" the game observed through its tinny little PC speaker when the Beav egregiously overpuffed on the eighth hole. He really stinks. You should see his slice. We talked over our mutual interest in heading off any attempt by Sparks, our planning guru, to do the will of Satan. After a while we lost track of time to the point where Walt had to call and ask where the dickens we might be. Those weren't his exact words, of course. We went.

The meeting didn't go badly. There was, as usual, a group of people who wanted to do something. And on the other side were the people who didn't. In the middle was Game-Master Walt, trying to figure out what to do in spite of the terrific spin everybody was putting on everything.

Business: the ultimate role-playing game. At first I just tossed a couple of Symantec jacks onto the table to see how hard they would be to pick up, bouncing the ball, tossing out

stuff, hauling it back in. Then I rolled out some transparencies produced in Persuasion and printed on my good old QMS 100, which achieves a sort of late neo-impressionist pallor through an entire range of color. I used the overheads to illustrate the impressive, populous Sim City of American enterprise that my plan would help the company achieve. Unfortunately, I built too fast, and when pressed about financial issues by Sparks, it was quite clear that my infrastructure would not hold. Before I knew it, it was Déjà Vu (from Icom Simulations) all over again. This caught me flat-footed. I have never played a long-term game at the office, working only quick hits like 3D Tic-Tac-Drop or Tetris (which I tragically had to quit when I started dreaming about it). Desperately grasping at straws, I countered with a hastily constructed



King's Quest defense, hammering out an exciting story line I thought might appeal to Walt's somewhat medieval sensibility. Confused, pressed on all sides, Walt suffered a fatal conflict at memory address 00A:00FC and froze the entire decision-making process until Thursday.

Death to the mutant zombie! Working, I guess, under the principle that one should keep one's friends close and one's enemies closer, I invited Sparks back to my office afterward to drink coffee. Neither of us was particularly pleased about the outcome of the game. I was furious, filled with unrequited hostility. We sat there for a while looking out the window at a blimp that had approached the building at eye level. I realized I had to do something. I felt a yearning to return to a very specific place, felt it as clearly and inexorably as a vampire seeks nightly reinterment in his native soil.

"Mind if I kill a few Nazis?" I inquired.

"Er, no," he lied, looking apprehensive. As well he might!

"Just make yourself comfortable, Larry," I said as I ran

"What's that?" he asked, leaning into the roaring wave of bullets.

the batch file and loaded. "We're going into Wolfenstein."

"What's that?" he asked, leaning straight into the roaring wave of bullets issuing from my blazing chain gun. It took him full in the front of the throat, blowing him and his pathetic esophagus backward into my credenza in a hail of mortar, flesh, and manila envelopes. "Ach! Mein Leben!" he cried out, and he died.

I stepped over my desk and leaped to where he lay seeping insincerity and bad intentions all over the industrial carpet. "Great game," he said.

"Yeah," I replied, satisfied. "Let's have lunch."

And so we did. OK, we don't like each other very much, and nothing good is likely to come of it. But you can't win if you don't play. ■

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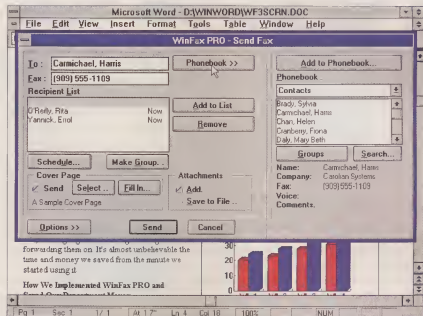
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PCs and TVs: Do You Really Want To Run Apps with Vanna White?

SOMETHING'S UP. WHY DID MICROSOFT TEAM UP WITH General Instrument and Intel to build a 386/Windows-based cable decoder that sits on top of your TV? Why did the US West telephone company invest in Time Warner's cable television operation? Why did IBM and Blockbuster Video join hands to create customized compact disks? Why is AT&T investing in games manufacturers and online networks? And why did Hewlett-Packard team up with a startup called TV Answer to create an interactive television environment?

Answer: Everyone sees a new, digital, communications-intensive multimedia world in the near future, and nobody wants to miss the gravy train. The real question, though, is just how will all of this work? It's obvious that communications technology and PCs have been successful partners, that television and communications have been equally successful, and that much of the technology is common. Doesn't it follow that computers will merge with television, cable communications will merge with telephone communications, and the electronic village of everyone's dreams will be a reality?

The content is the question. Easier said than done, I'm afraid. It's not because the technology is difficult. In fact, wonderful progress has been made already. Video and audio images can be compressed dramatically, making them compact enough to be useful in a digital environment. TV cable networks will soon be able to support the two-way communications necessary for interactive television, and telephone networks are likely to achieve enough bandwidth to transmit full-motion video images. The difficulty is figuring out what to do about the content. It's easy enough to say that interactive television, for example, can become a substitute for computers in the home, and you can already watch TV on many PCs. What's not easy to say is how we will use all of this.

The problem is that computers and their users are information-intensive, while television and its users are entertainment-intensive, and the audiences for each are fundamentally different. In general, information-hungry audiences tend to have special interests, which makes them very focused on particular types of information about particular types of products. On the other hand, entertainment audiences tend to be broadly focused. As a result, television content has more mass audience appeal, while information services, such as those online, have content designed for special interest groups.

Nonetheless, there are points at which a content merger is possible. Some online services, for example, are having success with interactive multiuser games, including knockoffs of popular television quiz shows. At the same time, some interactive television experiments have

successfully engaged viewers in activities like guessing the next play in football games. And of course, there is the legendary success of television-based shopping.

But I have a hard time imagining PC users spending much of their day 18 inches away from Vanna White, or shopping for china, silver, or even rare art. Even PC people who are not intense about their computers tend to be information-intensive, and wouldn't be satisfied with a service that didn't allow them to scan a database of diamond styles, and select the one they'd most like to own.

Another issue: Electronic entertainment of all kinds—at least in the short run—will cost. Note that broadcast television and radio are basically free to users, paid for almost entirely by advertising. Viewers are willing to pay for their television sets, but all you have to do is look at

last fall's legislation, which reduced cable TV rates, to know how most people feel about paying for anything else. It's not that the entertainment isn't worth anything to them, it's just that they've been trained to think of it as free.

What PC users want for their money. PC users, on the other hand, are used to paying for hardware, accessories, online services, and software. While the software piracy numbers could make you believe that lots of them aren't happy about paying, the downward trend in prices of software and online services should quiet down that controversy. In any case, PC users want their money's worth, and that means they want information, whether it's about computing, fishing, or buying a new car. Interactive sports isn't going to do that for them.

Don't get me wrong. I'm not saying there's no video or sound in your PC's future, nor am I saying there will be no computer intelligence in your next TV. In no time, you'll be able to guess the next play by your favorite quarterback on

Electronic entertainment—at least in the short run—will cost.

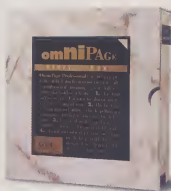
Sunday afternoon, or even bet on the Kentucky Derby via your TV. Your next PC will likely include enough video technology to allow desktop video teleconferencing, and will certainly allow you to play video and audio clips in business presentations. Just don't be surprised if the electronic village takes some time to become a densely populated city.

Farewell

This is my 36th and last column in this magazine. It's not that I don't enjoy teasing Intel, analyzing IBM, and ragging on the state of GUI interfaces; it's just that I've run out of time in which to do it. It may amuse you to know that it's the very multimedia future discussed in this column that has chewed up my time. Thanks for listening these last three years. ▀



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Windows on Copy Machines? Reach For Your Revolver, but Don't Fire Yet

DO YOUR OFFICE FAX MACHINES AND COPIERS RUN WINDOWS yet? If Microsoft has its way, they will soon. Its new "digital office" promises to simplify the way we all work. Is this something we all really need or just an electronic boondoggle? John and Paul tackle the issue.

SOMERSON: Microsoft's prototype At Work office automation software is definitely slick (and whizzy). But when copy machine users hear the words "simplify" and "Windows" in the same sentence, they'll reach for their revolvers.

DVORAK: The way things are going, a lot of people are going to be driven to using the quill pen. As someone pointed out to me, with all the bellyaching that knowledgeable users do about Windows and all this new stuff, imagine what the general public will do when confronted with a Windows interface on anything. These are the people who can't even set the time on their VCRs!

SOMERSON: Office machines today have terrible interfaces and are absurdly nonstandard. How many times have you walked over to an oddball machine in a colleague's office and punched all the buttons in a fruitless attempt to get it to do something simple? Finally you ask someone, who shows you the "secret." Pathetic. Some standardization would be good here. But Windows? Asking someone to slog through a succession of pull-down menus just to make a photocopy is nuts.

DVORAK: I think it's the beginning of a new Dark Ages!

SOMERSON: It's ironic that one of the partners in this project is Xerox, which tried a similar integration scheme a decade ago. Back then they called it the paperless office. It didn't catch on then and it won't now.

DVORAK: Yes, it was a fiasco for the most part. Zilog was into this too when they were the industry big shots and know-it-alls. How the mighty have fallen.

SOMERSON: And Wang. And even Exxon back when the PC first appeared. Think of the billions dropped on these unworkable projects, which turned something basic like reading a note into something fiendishly complex.

DVORAK: This is all part of the office automation nonsense. The idea is that if you took automation from the factory and applied it to office work, you could lay off all the white-collar workers and let the office automation machines do all the work. This assumes that office work is repetitive just like work on an assembly line, where at one station a spot welder welds

on a door hinge. Applying assembly line thinking to office work boggles the mind. I'm not convinced that this whole office automation notion isn't pie-in-the-sky nonsense that companies like Xerox and now Microsoft dream up when they run out of real ideas.

SOMERSON: The idea is to lay off all the white-collar workers? Get serious. Maybe some secretaries and receptionists. Look at the first fruits of that—universally despised voice mail.

The digital office does make some sense. Our office is utterly dependent on Lotus Notes. By using it, I theoretically have every draft of every story, every important memo, every data archive, and a lot of groupware work-in-progress documents at my fingertips. But Lotus Notes is even more hateful than voice mail, which is surprising because every other big Lotus product—Ami Pro, Freelance Graphics, Lotus 1-2-3 Version 4.0—is absolutely first-class, top-of-the-line. But Notes is a horror show.

Still, the idea of climbing out from under the mountains of paper is appealing. Paper's portable, but so are notebooks. And paper doesn't come with clipboards, text editors, and search engines. So why hasn't the paperless office caught on? Lots of answers: Not enough offices have scanners. OCR is only about 97 percent there. There isn't any great document-management software on the market. Notebooks are not quite mainstream yet. And last but certainly not least, our screens are all too small.

DVORAK: Take a look at the downsizing trend in big business ... it's the white-collar workers who are getting axed.

SOMERSON: But not because of automation.

DVORAK: Back to the subject. You finally hit the nail on the head. In fact it is exactly the screen size that's the problem. Although we'll all be using 19- and 21-inch screens on the desktop in the years ahead, the display on a notebook machine will never be larger than it is now—the size of the





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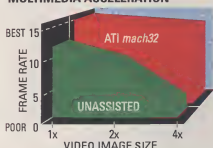
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Dvorak vs. Somerson

color screen on the IBM 700C. And as you point out, even a 19-inch display isn't the same as an office of paper piles that you can rummage through.

Lotus Notes has the right idea—and there are plenty of people in the company who love the product, I should mention—but software can only do so much when we're stuck with this small view, be it 10 inches or 19 inches.

SOMERSON: Notes has the right idea? Plenty of people love it? Reality check: If you mean companywide e-mail and shared databases are important, I couldn't agree more. But sorry, the Notes implementation truly stinks. The interface is wretched. It's what software would be like if the government wrote it.

What you're leading up to is that we're too docucentric. We think in terms of paper, and pages and margins. While this is familiar and works well when you're using equipment like copiers and fax machines, it has some painful limitations. Scaling and translating documents to screen is one. Marking up text and moving it around is another. So is adding voice annotation. So is being forced to futz endlessly to make dull text look pretty or to kill widows. And paper doesn't let you do interesting hypertext-like tricks or use video or translate to alien formats. No Hands Software's Common Ground and Adobe's Acrobat are a step in the right direction here.

DVORAK: Perhaps we need to don a set of virtual reality goggles and go into a larger field where we can work the way we really work: with a 360-degree, 3-D perspective. Then again we can just stick with paper (which we seem to be doing) or (try this one) we can change the way we work. Changing the way we work would mean limiting ourselves to what we can do within the field of a 19-inch monitor. We'd have to think differently. No more piles of paper. No more directories. No more envelopes with stuff inside them.

SOMERSON: Can you imagine an office full of zombies stumbling around under clumsy virtual reality headpieces, groping and reflexively stabbing at the air in front of them like the audience at a 3-D movie? Not a pretty picture.

Your idea of the giant field of view is interesting. Compare that with the teeny screens on otherwise-hot new personal digital assistants (PDAs) like Zoomer and Newton, which one day soon will be vital work links. One of the

really bonkers aspects of e-mail is that when someone sends you a wide document or a table, you have to scroll incessantly up and down and back and forth until you're dizzy. Try to scale it down to fit in a window, and it becomes too small to read. So you give up and do what every frustrated e-mail user does—you print the thing out.

But how is some newfangled Windows doodad like Microsoft At Work going to help this?

DVORAK: Duh! It's not! In fact, Microsoft At Work isn't going to help any of this, and personally I don't think it's designed to. It's just another way to get the Microsoft name in front of the public eye. Microsoft is into keeping its growth going and now has to resort to all sorts of tactics.

SOMERSON: Again with the Microsoft bashing. Yeah, yeah, John C. Dvorak, friend of the little guy, the defender of the poor, helpless user against the big, bad capitalist monsters. Give it up already.

OK, so Microsoft is eyeing huge potential businesses like interactive cable TV and the communications and office equipment markets. What's the crime? In the past everything was easier—you just switched channels or dialed numbers or punched through a fax. All three of these are getting far more complex and powerful. Now you can hook PCs into everything and make them jump through hoops for you. TV is becoming interactive and a true information-on-demand medium. Phones are performing all sorts of digital tricks. Broadcast faxes, faxbacks, and fax file transfers are giving business users real muscle; this will explode when PDAs and pocket communicators come on line. The current interfaces for all of these are pathetic and they all need a PC connection.

So Windows isn't the perfect answer. I couldn't agree more. It needs a lot of smarts and polish. And even a scaled-down version might drive yokels over the edge. But all this new digital electronics is crying out for standards, and at least Windows is a start.

DVORAK: Notes, meanwhile, is a real product and goes about as far into total integration and domination as I'd care to go.

SOMERSON: Sheesh. So go there already, Dvorak. The rest of us will wait for something better and easier to use.

DVORAK: Anyway, the more interesting phenomenon is that all these other companies line up behind Microsoft lockstep when Microsoft comes up with a plan like this. These companies are just joining in for publicity. There's nothing here. It's complete smoke. I don't think that all these office products will ever be incorporated into a bigger plan, which is what this idea calls for. Why should they? Do you think everything we own *has* to talk to every other thing? It's sick!

SOMERSON: What's sick about wanting to make 100 high-speed, collated copies of a report by sending it from your PC to the office copier with a button click instead of printing it out, walking it to the copier, and waiting in line? Or popping up your PC's phone listings, quickly

Companies are just joining in for publicity. There's nothing here. It's complete smoke.

highlighting a few names, and instantly having custom faxes sent to them without tying up your system? Or knowing in seconds when you last phoned the New York office, to whom you spoke, and for how long? Or adding some intelligence to otherwise annoying voice mail?

It's not smoke. It's good ol' Microsoft fear, uncertainty, doubt (FUD) engineering. Head off Apple's interface. Head off all other consortiums. Who's gonna invest in a standard that goes up against Microsoft? So what if modular Windows isn't exactly setting the world on fire? Face it, everything *will* be connected sooner or later. And it will all have goofy GUI interfaces. And we'll probably be paying royalties to Bill Gates.

Smart guy. ▀

Hewlett-Packard
and Microsoft
are changing the
way business
travelers work.



HEWLETT
PACKARD

OMNIBOOK 300

Dimensions (closed):
1.4" high x 11.1" wide
x 6.4" deep.

Weight: Less than
3 pounds: flash disk
model lighter.

Processor: 386SXLV
CPU.

Display: 640 x 480-dot
VGA; 9-inch LCD;
16-level gray scale.

**Available PCMCIA
Version 2.0 slots:**
Flash disk model: 2 slots.
Hard disk model: 1 slot.

RAM: 2 MB expandable
to 8 MB with optional,
user-installable RAM
expansion card.

I/O: 115k-baud serial
RS-232, serial infrared
and parallel. Optional
2400-baud data; 9600-
baud send/receive fax/
modem.

Actual size ►



Introducing the HP Omni

It's the best thing going for people who travel on business. Because it's the lightest full-function PC with a full-size keyboard. And it's loaded with all the features busy travelers need to take with them.



At less than 3 pounds, it lets people on the go breeze through airports. Measuring a sleek 1.4" x 11.1" x 6.4", the HP Omnibook 300 won't slow business travelers down. And their fingers can move across those familiar keys just as fast as on their office PC. Because the keys are the same size.



With 9 hours of battery life, travelers can keep on going.

That's continuous use of the flash disk model. (Flash disk cards, with no moving parts, greatly increase battery life, as well as reliability.) And the battery pack recharges in less than 1.5 hours. Or drop in four AA batteries. Even the hard disk model lasts 5 hours between charges.

Built-in mouse saves space, works anywhere. Press a button. Out comes the mouse.

It's not a ball or a stick. There's nothing extra to connect. It's a genuine mouse. And it pops up to make it as easy to handle as the ones people are used to working with. Which helps make working on the road as productive as in the office.



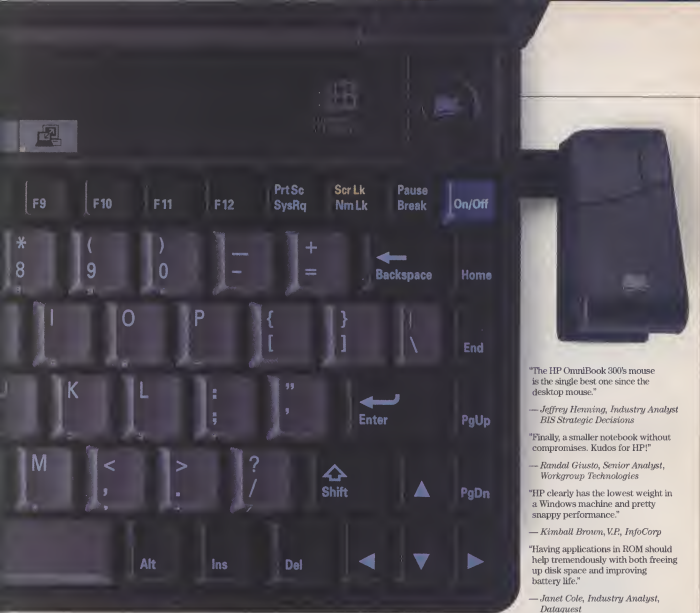
Microsoft® applications built into ROM. Being built into ROM makes all the difference. It means Microsoft Word, Excel and Windows® 3.1 come up instantly on the 9-inch LCD screen. No disk space wasted. No time lost booting. Or going in and out of applications. Instead, hit one function key and you're in business.

To add more MS-DOS® or Windows-compatible software, just load away.

It turns on instantly in the same place it's turned off.

Although this super-portable turns completely off to save battery life, it keeps track of the last screen. And that's where it turns on again. It doesn't even have to boot up.





"The HP OmniBook 300's mouse is the single best one since the desktop mouse."

—Jeffrey Henning, Industry Analyst
BIS Strategic Decisions

"Finally, a smaller notebook without compromises. Kudos for HP!"

—Randall Giusto, Senior Analyst,
Workgroup Technologies

"HP clearly has the lowest weight in a Windows machine and pretty snappy performance."

—Kimball Brown, V.P., InfoCorp

"Having applications in ROM should help tremendously with both freeing up disk space and improving battery life."

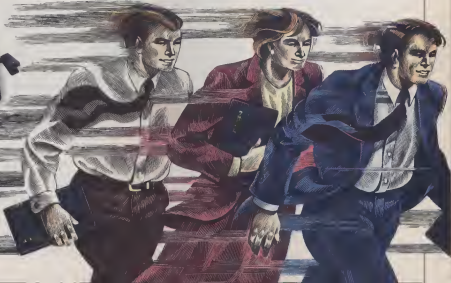
—Janet Cole, Industry Analyst,
Dataquest

Book 300 Superportable PC.

The HP OmniBook 300 can also be an organizer. An appointment and address book. An alarm clock. A calendar. A calculator. A link with the office PC. With options, a fax and an e-mail terminal.

The price to lighten the workload? Just \$1,950* for the hard disk model. \$2,375* for the flash disk model.

For more information or the name of your nearest HP OmniBook 300 dealer, call 1-800-443-1254, Dept. 236. It's going to make a lot of workloads lighter. Including yours.



**HEWLETT
PACKARD**

PENTIUM PCs: The First Generation

*They're here. They're hot. They're fast.
They're expensive. Should you rush out
and buy one?*

BY SEBASTIAN RUPLEY

Think fast. Wicked fast. Rocket fast. Lightning fast. Faster than a speeding bullet. *Pentium fast.* The first generation of Pentium PCs has arrived. True, they're harder to find than a genuine Rolex on the streets of New York City, and at these prices you'll think you're buying at Cartier, not CompUSA. Nevertheless, they're here.

ALR ProVEISA V

In brief: An easy, affordable upgrade for ProVEISA systems. We wish it were faster.

Description:
Standard tower.

Usability highlights:
Upgrading was as easy as dropping in a self-configuring processor card.

Price: \$9,640 for the system, \$2,395 for the board alone.



Judging by the early results, this CPU is exactly what it was

cracked up to be. On some tasks, it zooms along at twice the speed of the average 486DX2/66. And when applications are recompiled for the Pentium,

Hewlett-Packard NetServer 5/60 LM

In brief: The NetServer had more stamina than any other PC in our torturous NetBench tests.

Description: Double tower.

Usability highlights: Room for eight drives. Two-sided case makes going under the hood easy.

Price: \$16,000. Ouch.

Compaq Deskpro 5/60M

In brief: The coolest desktop Pentium machine—it's destined to be a hit.

Description: Looks like every other Deskpro.

Usability highlights:

The Pentium card slips easily into 386 and 486 Deskpro/M systems.

Price: \$8,679 and falling.



ALR Evolution VQ/60

In brief: Not the fastest, but room for 13 drives and 1GB of RAM keep this server competitive.

Description: Refrigerator-size tower.

Usability highlights: Double-sided case makes maintenance a snap.

Price: \$11,671—not a bank breaker for a system this expandable.



Zenith Z-Server LT

In brief: Not significantly faster with a Pentium chip than with a 486DX2/66.

Description: Standard tower.

Usability highlights: Easy one-card Pentium upgrade.

Price: \$11,793—could be cheaper.

expect another great leap forward in PC performance. Ultimately, the Pentium will redefine our notions of usability and power for operating systems and applications.

No PC chip has ever presented as many short-term moment-of-truth questions for buyers and system manufacturers. Sure, you want a Pentium, but which flavor? Will it make a better file server or desktop PC? And do you need one *now*? We brought five Pentium systems into our labs for an in-depth review. Roll up your sleeves, and join us for a look at some fast PCs with very bright futures.

NO COOKIE-CUTTER CLONES HERE

Like the first 386 and 486 PCs, these early Pentium machines are in danger of being typecast as network file servers, and the engineers who designed them have done nothing to dispel that idea. But these PCs are no cookie-cutter clones. We found huge differences among them. An optimist would argue that the Pentium chip lends itself to many different designs at many different price points; a pessimist would figure PC makers to be as confused as everyone else about where to enter the Pentium market.

Pinning down Intel on its Pentium plans is about as easy as predicting next year's federal deficit. Although the company has positioned the Pentium as the processor

of the future, it has publicly committed to building "over one million" Pentiums in 1994—a slim fraction of the 30 million 486 chips Intel has the capacity to produce next year. The Pentium's slow ramp-up is sure to keep 486 chips selling at a fast clip for a long time. The bottom line: 1995 looks more like the year of the Pentium than 1993. Many manufacturers have disclosed details of their Pentium-based systems, but few expect to deliver machines en masse before the end of the year.

Does this mean that first-generation Pentium systems are nothing to get excited about? Emphatically not. The Pentium systems we tested are, for the most part, rockets. Hewlett-Packard's Pentium file server in particular inspired technolust among reviewers who thought they'd seen it all. And just 30 seconds with Compaq's Deskpro 5/60M convinced us that it's the desktop PC for us.

Pentium power has a high price, however. The systems wore price tags ranging from less than \$8,000 to more than \$17,000. Our advice for the short term? Be wary of rushing out to buy a first-generation Pentium system. You'll get more bang for the buck when chip supplies become more plentiful. If, like us, you can't wait, use the *PC/Computing* Decision Maker on page 131 to be sure the system you choose matches the work you do.

WON'T FENCE YOU IN

Feeling constrained? These systems offer ample room to grow.

Given their storring role as network file servers, it's no surprise that these PCs have slots and drive bays galore. ALR's Evolution VQ/60 and the HP NetServer ore so big, they have double-sided cases—one side houses the motherboard and peripherals, and the other holds the drives.

ALR Evolution VQ/60
It sets the RAM standard.



13 drive bays



11 expansion slots



1GB maximum RAM



ALR ProVEISA V
A close second to the Evolution.



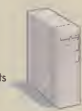
12 drive bays



10 expansion slots



256MB maximum RAM



Compaq Deskpro 5/60M
Think desktop, not server.



4 drive bays



7 expansion slots



136MB maximum RAM



HP NetServer 5/60 LM
Now that's a file server.



8 drive bays



8 expansion slots



384MB maximum RAM



Zenith Z-Server LT
Your basic plain-wrap tower.



7 drive bays



8 expansion slots

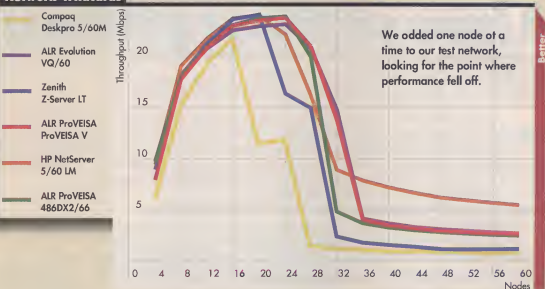


384MB maximum RAM



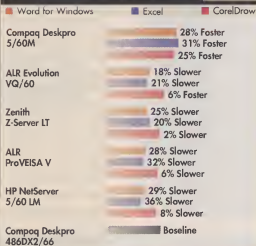
Pentium vs. 486: A Hint of Speed to Come

Network Wildcards



You would expect a network server to hold its own with 5 nodes. The real test came when we had 15 or more machines running on our network. Hewlett-Packard's NetServer 5/60 LM passed with flying colors, even with 60 networked PCs.

Windows 3.1 Rockets? Not Yet



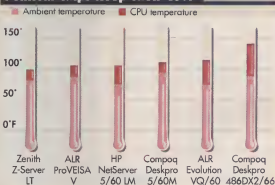
Better

Above: For really fast Windows applications, avoid first-generation Pentium systems. The exception to this rule: Compaq's Deskpro 5/60M.

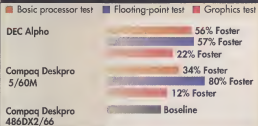
Above right: Damn the rumors, full speed ahead! Pentium chips actually ran cooler than a DX2/66.

Right: DEC's Alpha is touted as the world's fastest chip, yet Compaq's Pentium system held its own running a prerelease version of Windows NT.

Pentium Chips Keep Their Cool



Pentium, Alpha Take On NT



Better

Speed, Size Are Almost Everything

Our favorite: HP's brawny network quarterback.

There's one Pentium server worth writing home about: Hewlett-Packard's NetServer 5/60 LM. It blazed through our network tests, and it has the most thoughtful design of any of the Pentium systems we reviewed. Of the desktop PCs we tested, Compaq's Deskpro 5/60M gets our nod for both workstation-level applications and everyday Windows apps. See the *PC/Computing* Decision Maker at right for our buying recommendations and conclusions in the following key categories:

PERFORMANCE

Are Pentium systems really twice as fast as 486s? Not quite yet. Recomplied 32-bit applications will provide that level of performance, but for now Pentium servers aren't that much faster than comparable 486s. In fact, today's 486 PCs are often faster, thanks to design extras such as local-bus video. Still, our tests pointed to clear Pentium winners.

In our NetBench tests, in which 60 nodes are progressively added to a NetWare 3.11 network, HP's server was the throughput leader. In particular, as the network grew from 36 to 60 nodes, performance dropped markedly on the other systems while the HP kept going strong.

The desktop champ? Our application and video tests show that Compaq's Deskpro 5/60M is the fastest gun in town. Thanks to its QVision EISA video card, the Deskpro turned in raw video scores nearly four times faster than those of the other Pentium systems. In 32-bit applications, the Compaq also fared well—at processor-intensive and

floating-point-intensive tests, the Compaq proved nearly twice as fast when we replaced the 486DX2/66 chip with a 60MHz Pentium CPU. It gets our vote as the best high-end workstation, too.

EXPANDABILITY

Key to any file server is its ability to stash data—lots of it. ALR and HP get top marks here. The cases of ALR's Evolution VQ/60 and HP's machine are divided into two sections—one for the motherboard and one for the drives. ALR's Evolution VQ/60 wasn't a speed demon, but it was the most expandable system we tested, with

room for up to 13 drives and a gigabyte of RAM on the motherboard. The VQ/60 also includes a VESA local bus in addition to its 32-bit EISA bus for adding high-bandwidth peripherals. The ALR ProVEISA V came in a close second with 12 drive bays.

HP's NetServer isn't as expandable, but it's no runt. There is room for eight front-mountable drives in its closet-size case, and it holds up to 256MB of RAM (384MB if you opt for the proprietary memory expansion board).



HP'S NETSERVER 5/60 LM: FORTRESS, REFRIGERATOR, OR COMPUTER?

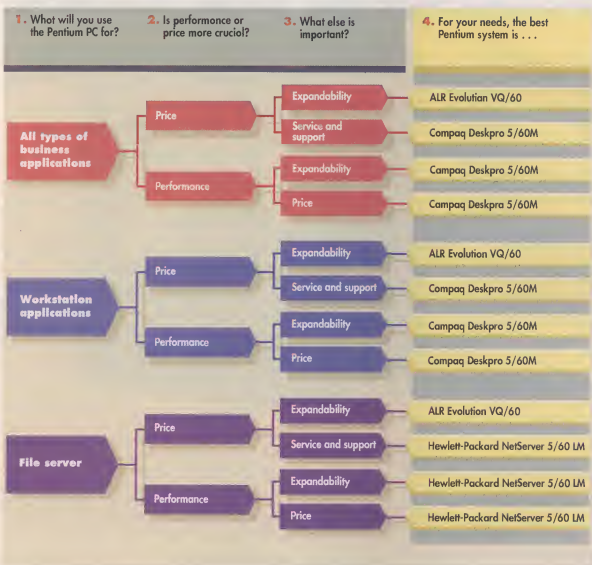
In performance and looks, the NetServer rules.

With its closet-size case, HP's NetServer 5/60 LM is every bit the network tamer it appears to be. Massively expandable, it holds up to eight drives and 384MB of RAM. Usability extras include a double-sided case for easy maintenance and an optional hot-swappable drive chassis.

HP's server was the clear throughput leader in our network tests. A lone caveat: The NetServer is expensive if you go for extras, although a base configuration starts at a reasonable \$7,649.

PC/COMPUTING DECISION MAKER

Choose the Pentium system that's best for your business.



SERVICE AND SUPPORT

Three years of service and support and a year of free onsite service come standard with all the Pentium systems we tested except ALR's. Both the ALR Evolution VQ/60 and the ProVEISA come with five-year warranties on the motherboard, but only 15 months on peripherals (the hard drive, the SCSI controller, and anything else not nailed to the motherboard). Given the huge number of complex peripherals in these Pentium systems, a 15-month warranty is cause for concern.

PRICE

Performance has its price. The powerful Hewlett-Packard NetServer we tested came stocked with a four-disk array of 1GB SCSI-2 hard drives and 32MB

of RAM. Thus configured, it costs \$17,797 list, or about \$16,000 on the street—enough to make your hand shake as you sign the purchase order.

At \$11,671 for our test configuration, ALR's Evolution VQ/60 costs less than you'd expect to pay for a system this expandable. ALR's ProVEISA V may seem somewhat expensive at \$9,640, as does Zenith's Z-Server LT at \$11,793, but not when you consider that Compaq's Deskpro 5/60M (remember, it's not a network file server) costs just \$8,679 for our test configuration. These aren't outrageous prices by any means, but they're certainly a lot more than you'll pay for 486DX2/66 systems that are often as fast or faster. By the time applications are recompiled for Pentium chips, however, all these systems will be much cheaper.

ALR EVOLUTION VQ/60

It's Massive... But We've Seen Faster

Performance: HP's NetServer easily outran it.

Expandability: Bigger in sheer volume than any other system we tested. It holds a staggering 13 drive bays and up to 1GB of RAM.

High points: Three EISA expansion slots double as VESA local-bus slots.

Low points: The VESA local-bus architecture is a great idea, but the system we tested didn't include a single VL-Bus peripheral.

Price: \$11,671—less than you'd expect to pay for a system of these proportions.

Should you buy it? If you need the expansion, yes. But for sheer Pentium muscle, HP's NetServer is a better buy.

ALR's awesomely expandable Evolution VQ/60 is a power-house server that resembles a refrigerator. It holds a gigabyte of RAM on the motherboard and a staggering 13 drives—more than any other Pentium system.

However, the Evolution also illustrates a key point about first-generation Pentium systems—they don't always have the graphics and disk subsystems to match the performance of the processor. This server fell short when it came to total performance. The Evolution VQ/60's performance dropped dramatically with more than 20 nodes on our test network. It's the Evolution VQ/60's expansion capability that keeps it competitive.

3 internal fans.

Enormous double-sided case.



10 EISA slots—3 double as VESA local bus slots.

Holds 1GB of RAM.

Room for 13 drives—more than any other Pentium.

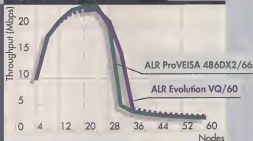
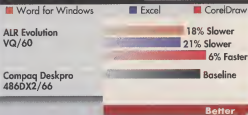
Our system came configured with 32MB of onboard RAM and an array of four 540MB SCSI drives. At \$11,671, the Evolution isn't a budget buster.

Our verdict? The ALR Evolution VQ/60 is the Pentium PC to have if expansion is your top consideration. For screaming network performance, however, HP's NetServer is a better choice.

ALR Evolution VQ/60

\$11,671 • Advanced Logic Research • 9401 Jeronimo Rd., Irvine, CA 92718 • (800) 444-4257, (714) 581-6770

Circle No. 658 on Reader Service Card

Network Performance**Windows Performance**

ALR's Evolution proves that size isn't everything. This behemoth couldn't outperform a 486DX2/66 in either our network or our Windows application tests.

ALR PROVEISA V

An Easy Upgrade, but Why Bother?

Performance: The Pentium ProVEISA was only marginally faster in network tests than the same box with a 486DX2/66 chip.

Expandability: A roomy tower with space for 12 drives and 256MB of RAM.

High points: An easy Pentium upgrade for 486-based ALR ProVEISA systems.

Low points: The 32-bit cache-to-memory path means less-than-optimal Pentium performance.

Price: \$2,395 for the upgrade card or \$9,640 for the system as configured.

Should you buy it? Even ALR is steering buyers toward the faster and better-designed Evolution VQ/60.

When ALR introduced its Pentium-optimized Evolution VQ/60 systems, it also had a promise to keep: Pentium processor boards for owners of its upgradable 486 ProVEISA file servers. ALR's second Pentium announcements are 60MHz and 66MHz Pentium upgrade boards.

Turning a 486-based ALR ProVEISA into a Pentium machine is a snap. The self-configuring Pentium processor board plugs into a proprietary slot on the ProVEISA motherboard.

The biggest disappointment with the ProVEISA was its performance. The Pentium ProVEISA V was only marginally faster than the same system configured with a 486DX2/66—this is due in part to ALR's memory design. Unlike ALR's Evolution VQ/60, which pushes data across a 128-bit path between cache and memory, the ProVEISA forces data through the slower 32-bit EISA path for cache-to-memory transactions. Although the ProVEISA ran neck and neck with the Evolution in NetBench tests, the design will be a liability

Standard tower can be configured as either desktop system or server.

Room for up to 12 drives.

Holds up to 256MB of RAM.

Pentium sits on a self-configuring, \$2,395 upgrade module.

ity when applications are recompiled for the Pentium.

The 60MHz Pentium upgrade board starts at \$2,395; the 66MHz version is \$2,695. Buy a system to wrap around the upgrade board, and the price increases sharply—the ProVEISA V we tested costs \$9,640.

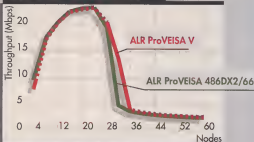
Should you buy a ProVEISA with a Pentium upgrade? No. The 60MHz Pentium ProVEISA is only marginally faster than a 486DX2/66.

ALR ProVEISA V

\$9,640 • Advanced Logic Research • 9401 Jeronimo Rd., Irvine, CA 92718 • (800) 444-4257, (714) 581-6770

Circle No. 659 on Reader Service Card

Network Performance



Windows Performance

Word for Windows Excel CorelDraw

ALR ProVEISA V

28% Slower

32% Slower

6% Faster

Compaq Deskpro 486DX2/66

Baseline

Better

Thanks to a memory design that forces data across its 32-bit EISA bus, the ALR ProVEISA's performance failed to surpass that of an identically configured 486DX2/66.

COMPAQ DESKPRO 5/60M

The Ultimate Windows PC—For Now

Performance: The champion in our Windows application tests. High floating-point and processor scores in our Windows NT tests make this machine our choice for a high-end workstation.

Expandability: It's a desktop system, not a server, but the 136MB of RAM and seven slots are ample, even for a workstation.

High points: The 20-inch QVision monitor, high-resolution QVision video adapter, and integrated Business Audio set the standard for multimedia.

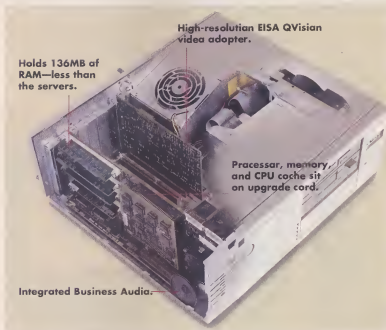
Low points: Sluggish NetWare performance.

Price: \$7,649—pricey for a desktop.

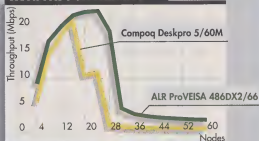
Should you buy it? If you can afford it, this is the desktop Pentium to buy. Otherwise wait; prices are falling fast.

Maybe it's the astonishingly fast video performance of the Compaq Deskpro 5/60M's QVision EISA card. Or maybe it's the gorgeous 20-inch monitor and trim design. Whatever it is, we like it. Unquestionably, this is the desktop PC to die for.

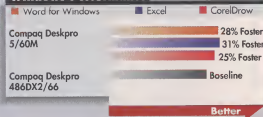
For its Pentium systems, Compaq engineered a processor upgrade card that slips easily into the proprietary slots in 386- and 486-based Deskpro/M systems. But unlike ALR's ProVEISA Pentium upgrade, Compaq's processor card also holds the memory and the CPU cache, so system performance isn't slowed down by the upgrade card.



Network Performance



Windows Performance



In Windows application tests, the Compaq was faster than any system we've ever tested. Sluggish NetBench results make it a poor choice for a server, however.

The Compaq machine we tested included a 20-inch QVision 200 monitor coupled with Compaq's high-

resolution EISA QVision video adapter. Thanks to this combination, the Compaq turned in video scores nearly four times better than those of the other Pentium systems. Also unique to the Compaq is its integrated Business Audio. The audio and video capabilities of the Compaq will make it a standard for advanced multimedia applications.

Compaq estimates street prices for the unit we tested at roughly \$8,679. Owners of 386- or 486-based Deskpro/M systems can go the Pentium route with a processor upgrade card. The cost of moving from a Deskpro/M 486/33 to a 60MHz Pentium is a tempting \$2,599.

Compaq Deskpro 5/60M

\$8,679 • Compaq Computer Corp. • P.O. Box 692000, Houston, TX 77269-2000 • (800) 345-1518, (713) 370-0670
Circle No. 660 on Reader Service Card

HEWLETT-PACKARD NETSERVER 5/60 LM

The Network Supersystem

Performance: It's the fastest Pentium server you can buy.

Expandability: Room for eight drives and 384MB of memory.

High points: Thanks to the Mylex SCSI-2 caching controller, the HP's performance rivals that of Unix/RISC-based platforms.

Low points: A fully configured system costs a bundle.

Price: \$17,797.

Should you buy it? This is the server we want on our network.

Hewlett-Packard's spacious NetServer 5/60 LM is the fastest, most bulletproof Pentium system we tested. Like the ALR Evolution VQ/60's case, the NetServer's has two sections: one for the motherboard and one for the drives. You can cram as many as eight drives into the NetServer, and it supports 256MB of RAM (384MB if you spring for HP's own memory-expansion board).

Built around an Intel motherboard with an integrated Pentium chip, our test system included four 1GB SCSI-2 hard drives, a 256K external write-back CPU cache, and 32MB of RAM.

In our LAN tests, the NetServer's performance was unparalleled. Its results rivaled those of Unix/RISC-based platforms thanks to its Mylex SCSI-2 caching controller with 4MB of cache.

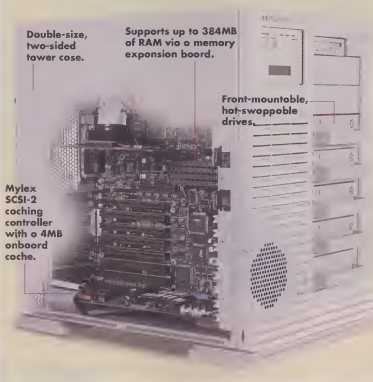
Pricing for the NetServer is steep. The unit we tested

Double-size, two-sided tower case.

Supports up to 384MB of RAM via a memory expansion board.

Front-mountable, hot-swappable drives.

Mylex SCSI-2 caching controller with a 4MB onboard cache.



retails for \$17,797 (about \$16,000 on the street). Add another \$306 for a basic 14-inch monitor. The base NetServer configuration, which includes two 1GB SCSI drives, starts at a more reasonable \$7,649.

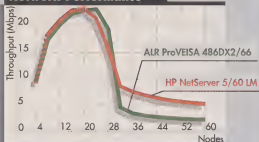
If you want the network throughput champ, the NetServer is your dream machine.

Hewlett-Packard NetServer 5/60 LM

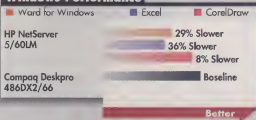
\$16,000 • Hewlett-Packard • 3000 Hanover St., Palo Alto, CA 94304 • (800) 752-0900, (415) 857-1501

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Network Performance



Windows Performance



On LANs, HP's NetServer had more stamina than any other system, especially as nodes were added. Windows application tests brought the HP's scores back to earth.

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super crisp *Dual Scan
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LeaderBook Pro

486SX/25 or 486DX/33 processors • 4 MB RAM • 60 or 120 MB HDD • 1.44MB, 3.5" floppy • Choice of Monochrome (13.1 contrast ratio, 10" screen), Dual Scan Color (10" screen), or the Active Color (8.5" screen) • All models support external monitor resolutions up to 1024 x 768 x 16, 800 x 600 x 256 • 1 parallel port & 1 serial port • Locking dual Ni-Cad batteries and power adapter • Full size keyboard with separate "PgUp" and "PgDn" keys, a total of 84 keys • Ergonomic palm-rest and trackball, keyboard tilt feature • 12 function keys • External keyboard port • DOS 6 & Windows 3.1 pre-loaded • 9.2" x 11.3" x 1.9", only 6.6 pounds • carrying case

ADDITIONAL OPTIONS

FAX/MODEM • 200MB HDD • Auto adapter • Extra Ni-Cad batteries • Memory expansion cards





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ADDITIONAL OPTIONS

Memory expansion cards ♦ 120MB HDD ♦ Extra batteries
 ♦ PCMCIA LAN adapter ♦ PCMCIA Fax/Modem ♦ External 3.5" floppy drive

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LeaderBook Pro

| CONFIGURATION | MONOCHROME | DUAL Scan COLOR | ACTIVE COLOR |
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| 486/SX-25 4 MB RAM 80 MB HDD | \$1595 | \$2295 | \$3195 |
| 486/DX-33 4 MB RAM 80 MB HDD | \$1895 | \$2595 | \$3495 |

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ZENITH Z-SERVER LT

Neither a Desktop Nor a Server

Performance: Nothing to write home about—midrange in both network and Windows applications tests.

Expandability: This standard tower with seven drive bays can be configured as either a desktop machine or a network file server.

High points: The Z-Server's built-in CD-ROM drive should be standard equipment on all Pentium-based PCs.

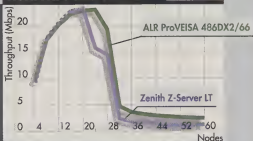
Low points: Lackluster performance on network tests.
Price: \$11,793. A scaled-down model with a 510MB SCSI drive, 16MB of RAM, and an Adaptec SCSI controller starts at \$7,499.

Should you buy it? Not at today's prices. HP's entry-level NetServer, priced at about \$7,000, is a much better buy.

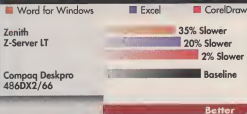
Zenith Data Systems' Z-Server walks a fine line between network file server and desktop PC, depending on how you configure it. Fill all seven drive bays, and you're looking at a tower with ample network expansion. Fill just one bay and hook it to Zenith's \$999 17-inch monitor, and you're looking at a Pentium workstation. Alas, configured either way, it's slower than a 486DX2/66-based system.

The model we tested came configured as a file server, housing an Adaptec controller, an array of four 535MB SCSI hard drives, and 32MB of RAM. Also onboard was an internal CD-ROM drive—handy for loading large operating systems and applications on

Network Performance



Windows Performance



Mediocre performance and relatively scant expansion options make the Z-Server an also-ran in both our Windows application and our network performance tests.

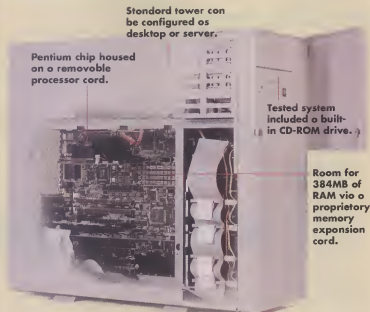
the server. The Pentium processor sits on a removable card and includes a 256K external cache.

So how did the Zenith stack up speedwise? So-so. It actually ran slower than a 486DX2/66 machine on both our network and Windows application tests.

Considering this unimpressive network and Windows performance, the Z-Server's \$11,793 price is hard to justify. True, a stripped-down configuration with only one 510MB SCSI drive, 16MB of RAM, and the Adaptec SCSI controller costs just \$7,499. Even so, HP's basic NetServer configuration (which includes two 1GB SCSI drives in an internal array and 16MB of memory) is cheaper, at just under \$7,000, and much faster.

Zenith Z-Server LT

\$11,793 • Zenith Data Systems • 2150 E. Lake Cook Rd., Buffalo Grove, IL 60089 • (800) 553-0331
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Powerhouse PCs

First-generation Pentium systems run the gamut from desktops to megaservers.

| | ALR Evolution VQ/60 | ALR ProVEISA V | Compaq Deskpro 5/60M | HP NetServer 5/60 LM | Zenith Z-Server LT |
|---|---|---|---------------------------------------|------------------------------------|------------------------------------|
| SPECIFICATIONS | | | | | |
| Installed RAM/speed | 32MB/70ns | 32MB/70ns | 24MB/80ns | 32MB/70ns | 32MB/80ns |
| Maximum RAM | 1GB | 256MB | 136MB | 384MB | 384MB |
| External CPU cache | 512K | 512K | 256K | 256K | 256K |
| Bus architecture | EISA, VL-Bus | EISA, ISA | EISA | EISA | EISA |
| Size | Double tower | Standard tower | Desktop | Double tower | Standard tower |
| PERIPHERALS | | | | | |
| Hard drive | Conner CP30540 (SCSI) | Conner CP30540 (SCSI) | Conner CP3541 (IDE) | Seagate 1288N (SCSI) | Seagate 3610N (SCSI) |
| Hard drive configuration tested | Four 540MB-drive array | Four 540MB-drive array | One 510MB drive | Four 1GB-drive array | Four 535MB-drive array |
| Hard drive controller | UltraStar 124F SCSI | UltraStar 124F SCSI | Integrated IDE | Mylex SCSI-2 | Adaptec SCSI-2 |
| Additional drives | 3½-inch floppy | 3½-inch floppy | 3½- and 5¼-inch floppies | 3½-inch floppy | CD-ROM and 3½-inch floppy |
| Video | WD90C31 chip (on a card) | WD90C31 chip (integrated) | QVision EISA card and 20-inch monitor | WD90C31 chip (integrated) | WD90C31 chip (integrated) |
| EXPANDABILITY | | | | | |
| Total expansion slots/available slots | 10/8 EISA, 3 double as VL-Bus | 10/7 EISA, 1 ISA | 7/5 EISA | 8/5 EISA | 8/5 EISA |
| Drive bays (internal/external) | 0/13 | 7/5 | 1/3 | 0/8 | 4/3 |
| Upgradable CPU | No | Yes | Yes | Yes | Yes |
| Fans (in addition to power supply fan) | 3 | 2 | 1 | 2 | 1 |
| PRICE | | | | | |
| Base price | \$6,895 | \$2,395 (upgrade module only) | \$5,499* | \$7,649 | \$7,499 |
| Estimated street price | \$11,671 | \$9,640 | \$8,679 | \$16,000 | \$11,793 |
| SERVICE/SUPPORT | | | | | |
| Warranty | 5 years for system, 15 months for peripherals | 5 years for system, 15 months for peripherals | 3 years for system and peripherals | 3 years for system and peripherals | 3 years for system and peripherals |
| Onsite service | Optional | Optional | Yes | Yes | Yes |
| *CPU upgrade modules for Deskpros also available. | | | | | |

Should You Play The Waiting Game?

Next year's Pentium PCs will be faster, cheaper.

Pay now or buy later. That was the choice with first-generation 486 machines, and so it is with Pentium PCs. Performance, reliability, the future of 32-bit applications—and price—will profoundly affect the success of the Pentium.

• **When should you buy?** Now, if you demand the fastest PCs at any cost. With equivalent peripherals, Pentium systems absolutely outpace 486 systems. But for maximum value, wait. Prices for Pentium systems are likely to drop 25 percent by the end of the year, and mainstream applications won't be recompiled for the chip en masse until well into 1994.

• **Are Pentium systems really twice as fast as 486DX2/66s?** Right now, no. But make no mistake—sometime next year 32-bit operating systems and applications will hit the mainstream. In our tests, the Pentium was twice as fast at churning out 32-bit code as clock-doubled 66MHz 486 chips were.

• **Do \$18,000 Pentium systems really melt when you leave them on?** In spite of the chip's 3.1 million transistors (three times as many as on a 486 chip), our temperature tests show that the heat issue is overblown. Pentium systems run no hotter than 486 machines—in fact, they run cooler.

• **Are Pentium upgrades for real?** You bet. Upgrade cards will drop in price quickly—and let you leverage last year's hardware investment. But take heed of implementation: Compaq's upgrade design is preferable to ALR's because it puts both external cache and memory on the CPU card.

• **Will the Pentium chip have a big impact on software?** No question. Scorchingly fast Windows applications are only the beginning; 32-bit operating systems, CAD, multimedia, graphics, spreadsheets, and handwriting recognition will all become richer and deeper when driven by Pentium chips. ■

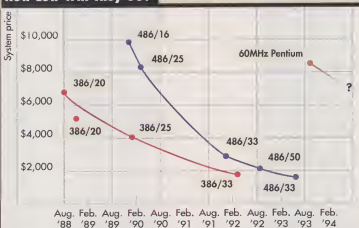
HIGH PRICES, SHARP DROPS

Where will the Pentium fall on the price curve?

Those who cannot remember the past are condemned to repeat it. When it comes to chips, that's an expensive history lesson. PCs based on new chips come in at lofty prices that quickly fall to affordable levels.

This chart shows how the prices of 386 and 486 systems we've evaluated have fallen over the years. A telling quote from our December 1989 review of the \$10,000 ALR PowerCache—one of the first 486 PCs: "While the 486 processor can offer mammoth performance gains, the PowerCache 4 has neither disk nor graphics subsystems to match the processor technology." The same can be said of first-generation Pentium systems.

How Low Will They Go?



Appeared in PC/Computing

History will repeat itself. Each successive new PC processor commands ever-higher prices at the outset—and then drops ever more dramatically.



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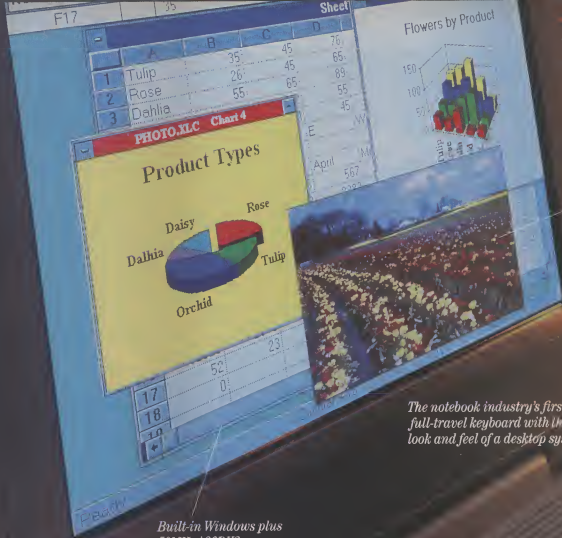
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HEY, WHAT ARE YOU
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If you've been waiting for an active matrix color notebook with true desktop power, your wait is over. Thanks to the new TravelMate 4000E WinDX2/50 Active Matrix Color notebook

from Texas Instruments.

With 256 brilliant, simultaneous colors and a 50MHz 486DX2 processor, this power-

house doesn't just whisper color, it screams it.

And yet the TravelMate 4000E weighs a mere 6.2 pounds, including battery. This convenient size and weight gives you more performance* than the leading 486 notebooks.

Thanks to the built-in Windows 3.1 and useful TI utilities, you can power up to Windows in just 15 seconds. And the TravelMate 4000E is Windows NT-compatible. With 4MB of main memory, expandable to 20MB, you're ready for today's and tomorrow's software.

Using the mouse on the TravelMate 4000E is a snap. The Microsoft BallPoint™ mouse with QuickPort™ connection snaps on and off and needs no cable, giving you more flexibility and better ergonomics than a built-in mouse. With the

industry's first 4mm, full-travel keyboard, the TravelMate 4000E gives you the feel of a desktop. If you work on the go, you'll also go for the rugged 200MB hard disk drive, the high-speed video bus and 1MB of video RAM, as well as the full range of connectivity options – snap-on modules for Ethernet® LANs, SCSI-compatible devices and an internal 14,400 bps V.32 bis modem with 9,600 bps send/receive fax capability.

50MHz DX2 processor with coprocessor provides desktop performance in a notebook.



New, desktop-like keyboard with separate function keys.

Of the leading active matrix color notebook manufacturers, only TI offers the desktop performance of a 50MHz DX2 processor.

| Active Color Notebook | Weight (lbs.) | 486 Processor | Speed | Coprocessor |
|-----------------------|---------------|---------------|-------|-------------|
| TravelMate 4000E | 6.2 | DX2 | 50MHz | Yes |
| Toshiba T4800C | 6.9 | SL | 33MHz | Yes |
| Compaq LTE Lite 4/30c | 6.5 | SL | 33MHz | Yes |
| IBM ThinkPad 720C | 7.6 | SLC2 | 50MHz | No |

Texas Instruments offers over 10 models of 486 notebooks for you to choose from.

TI TravelMate 486DX2 Notebooks



For more information about the world's widest range of 486 notebooks, as well as the location of the dealer nearest you, don't wait another nanosecond. Call **1-800-527-3500**

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When your ideas are on the line, first impressions are **CRUCIAL**. Project a few

clear, crisp bullet points and—bang!—you've captured your audience for good. And to make sure that those first impressions last, don't leave anything to chance. Colorful leave-behinds reinforce your **MESSAGE** in a way that flat, gray copies can't.

In this month's special report, *PC/Computing* reviews three categories of PC-based tools that

Color Presentations

146 PRESENTATION SOFTWARE

5 Windows solutions that help outline your ideas and package them for results.

170 COLOR PRINTERS

15 printers with output that continues to convince long after the presentation is over.

194 LCD PANELS

12 LCD panels that project your image in a larger-than-life format.





elevate presentations to a fine art. Presentation graphics software helps you outline your ideas and package them in crystal-clear slides guaranteed to get **RESULTS**. Color printers capture those fleeting onscreen images on paper, where they can continue convincing your audience even after you've left the room. And brilliant LCD panels let you project even the biggest ideas in a **LARGER-THAN-LIFE** format.



Can you succeed in business without mastering the art of the presentation? Maybe. Do you want to take that chance? No way. Find out which tools will help you **PERSUADE**—and your business prosper.





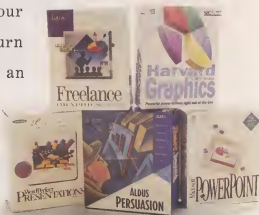
Presentation POWER

**Pie charts persuade. Images impress. Multimedia moves.
Take charge with presentation software.**

BY PRESTON GRALLA

You wouldn't let a stranger pack your parachute. So why would you turn over your most valuable ideas to an anonymous service bureau and hope for the best? When you want a presentation done right, you do it yourself.

The right presentation software lets you do it all yourself—without sacrificing an ounce of impact or professional pizzazz. It can help you clinch the deal of a lifetime by turning your ideas and data into effective visual arguments. From matter-



Windows Presentation Packages

Lotus Freelance Graphics for Windows 2.0

Software Publishing Harvard Graphics 2.0 for Windows*

Aldus Persuasion 2.1

Microsoft PowerPoint 3.0

WordPerfect Presentations 2.0*

* We tested prerelease versions of these products.

of-fact text with bullets to full-motion video, presentation software conveys ideas in ways that words alone cannot. When you've prepared the slides yourself, you know that the images on the wall are perfectly in step with the ideas in your head.

But one size does not fit all. For some people,



Step 2. Import graphic.



Step 3. Add slide title.

Step 4. Apply finishing touches.



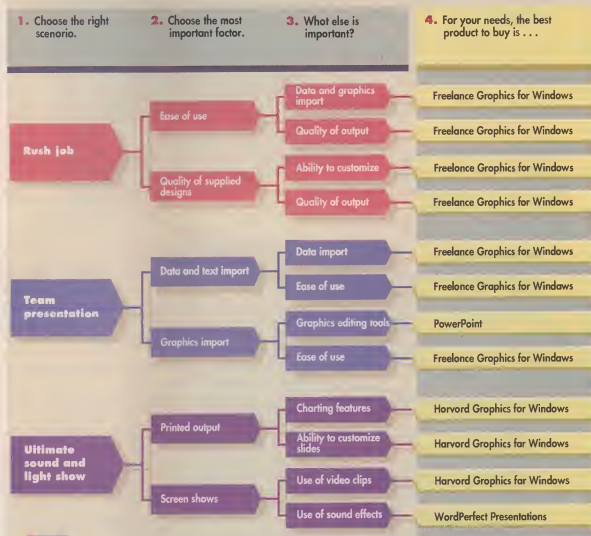
what matters most is how quickly they can create a presentation under pressure. Others need to integrate co-workers' efforts into their own presentations. Still others demand a presentation that would earn two thumbs up from Siskel and Ebert.

To cut through the complexity, we've looked at five top

Windows-based presentation graphics packages to see how well they hold up in three scenarios: the rush job, the team presentation, and the ultimate sound and light show. And no matter what scenario you find yourself in, you need a program that's easy to use. So we put the contenders through the paces at *PC/Computing's* Usability Labs.

PC/COMPUTING DECISION MAKER

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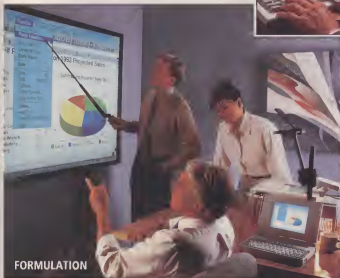


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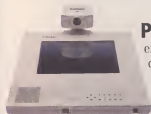
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And once you have formulated your concepts in the workgroup, you can present them at meetings, training sessions, or boardroom presentations. You can even augment presentations with video by connecting a video source, such as a VCR or laserdisc, to a Proxima projection system.

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USABILITY When your deadline is measured in minutes, you need a presentation program that practically reads your mind. Truly easy-to-use software lets you choose a ready-made master presentation and quickly customize it. Lotus Freelance Graphics for Windows, which won the hearts of everyone who stepped into PC/Computing's Usability Labs, simply won't allow you to make a wrong step.

For example, before you create the first slide, Freelance prompts you to choose a master style and then choose slide templates from groups of thumbnails. Your slide pops up with placeholders where you can input data or text. (When we refer to a master or master style, we mean a design applied to every slide in a presentation, like background colors and logos. A template or slide template, on the other hand, is the general layout for a specific type of slide, like a vertical bar chart.)

WordPerfect Presentations for Windows, the usability runner-up, immediately presents you with a title slide and a master background already selected. To choose a different background and slide, you must go through a several-step process. The same holds

true with PowerPoint. In Aldus Persuasion, instead of a preselected template, you face a blank screen.

Harvard Graphics mirrors the Freelance approach, but it doesn't go far enough to be called exceptionally easy to use. When you create a data slide, for example, you find yourself in a data form that looks like a blank spreadsheet—not an especially intuitive tool.

FAST AND POWERFUL OUTLINING Don't think; just type. An outliner is the quickest way to turn rough ideas into a ready-for-prime-time presentation. Freelance's outliner—which looks just like a lined legal pad—neatly combines power and ease of use. Choose your slide type and master style from within the outliner to create almost an entire presentation in just a few minutes. Persuasion and WordPerfect also let you choose a master style and slide type from the outliner, while PowerPoint lets you choose a master style only.

The only outliner that rivals Freelance's is the one in WordPerfect Presentations, which has more features but isn't as easy to use. For example, you can create transition effects for screen shows (such as an animated wipe between slides) from inside the outliner. But Freelance's icons are more straightforward than the confusing menu choices available in WordPerfect's outliner. Persuasion's outliner also gives you access to transition effects from its menus.

HIGH-QUALITY PRINTOUTS By the time a presentation works its way through a black-and-white laser, the muddy, hard-to-read results lend new meaning to the phrase plain paper—unless you use Freelance, which makes printing great-looking handouts a breeze. For example, to see what a color master will look like printed in black and white, just click on the black-and-white icon. To change back to color, click on the color icon. None of the other programs offers this preview feature, but all except Persuasion automatically convert color images when laser printing.

EFFECTIVE SPEAKER'S NOTES Speaker's notes make you look like a genius, especially when you haven't had a lot of time to prepare for your presentation. Here, too, Freelance has the usability edge. When you create speaker's notes, a small icon shows up in both the slide view and the slide sorter to indicate which slides have notes associated with them. To edit the notes, just click on the icon.

By contrast, PowerPoint, Harvard Graphics, WordPerfect Presentations, and Persuasion don't show speaker notes in the outliner or slide-sorter view.

Lotus Freelance Graphics for Windows 2.0



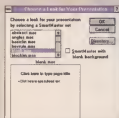
When you put together a presentation under pressure, you'll appreciate Freelance's overall ease of use and attention to the little details that can derail a presentation.

For more information, see "Showstopping Slits," page 168.

How Fast Can You Finish a Master Slide?

Freelance makes you a slide maestro in a fraction of the time Persuasion needs.

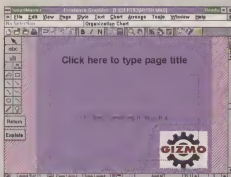
Freelance Graphics



Step 1. To create a new SmartMaster, select a blank master to be customized. From the slide type options, choose Basic Layout.



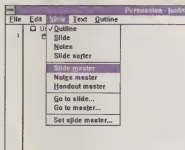
Step 2. Select Edit Page Layouts and place a colored background and logo on the slide. View new templates to see each slide type.



Step 3. Select the slide you want to work on—the art is correctly sized. Your SmartMaster becomes part of Freelance's master library.

2:45 (minutes:seconds)

Persuasion



Step 1. When Persuasion loads, it takes you to the outliner. Select the Slide master menu item to customize an existing blank master.

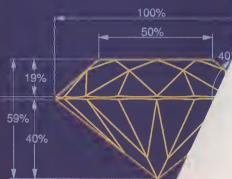
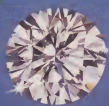


Step 2. Place the color and logo on the background slide, guessing where to place the art so that it doesn't overlap with text.



Step 3. View each slide to check art placement; keep resizing. Finally, edit each slide template so art fits each one. Save as an AutoTemplate.

5:20 (minutes:seconds)



Nothing Endures Like A Diamond.

The diamond. A product of the millennia that is everlasting. Clear, brilliant and dazzling – an appropriate reflection of the literal translation of the Mitsubishi name, which means *Three Diamonds*. Like the diamond, Mitsubishi's family of 14"/16" value priced Diamond Scan and 14"/17" high performance Diamond Pro®

color monitors are the industry benchmark for quality and longevity, as

well as application versatility. ♦ All Mitsubishi monitors feature high-resolution and low emission designs – at an affordable price. And unlike other monitors that often fail after just one year, Mitsubishi monitors are engineered to last and are backed by a three-year warranty on parts and labor. ♦ The

Diamond Scan 14 has SVGA performance up to 1024 x 768 interlaced, while the Diamond Pro 14 offers flicker-free 1024 x 768 non-interlaced resolutions (up to 72 Hz) for full Windows™ compatibility. ♦ For advanced Windows or Macintosh® based high-resolution applications requiring a larger display, the Diamond Scan 16 provides 39% more display area than 14" models and 19% more than 15" FS designs, without crowding your desktop. The Diamond Pro 17 offers an even larger Trinitron® CRT, yet has the most compact enclosure of any 17" display. Both models feature the Diamond

Match Color Calibration System for precise on-

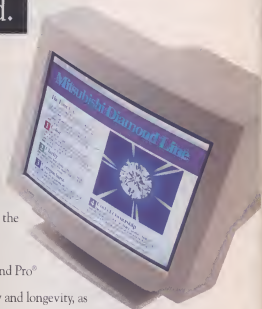
MSRP: DS14 \$499; DS16 \$1169

screen color matching. ♦ The Diamond Scan and Diamond Pro color monitors. Because

MSRP: DP14 \$599; DP17 \$1499

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Mitsubishi Electric Sales Canada, Inc., 4299 14th Avenue, Markham, Ontario L3R 0J2

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TEAM PRESENTATION

SUCCESS IS JUST A signature away, but you can't close the deal on your own. Your knockout presentation is in pieces on the network: Finance has the numbers, marketing has new logos, and research has the big picture. Your job is to pull it all together into a winning package.

POWERFUL SPREADSHEET IMPORTING You can bet your business plan that most of the files you'll be pouring into the master presentation started out in someone's spreadsheet. While all of the programs we tested allow you to import spreadsheet data, Freelance goes a step further: It actually opens the spreadsheet file and lets you use your mouse to define the data, the labels, and the legend that you want to import.

PowerPoint and Harvard Graphics also let you import parts of a spreadsheet, but you need to specify the exact ranges—information you're unlikely to know off the top of your head, especially if someone else created the spreadsheet. These two programs, along with Persuasion and WordPerfect, import chart legends and titles, but they do so by brute force, not intelligence, and properly placing them on the page requires more work on your part.

Harvard Graphics is the best of the programs that let you manipulate imported spreadsheet data. Harvard's full-featured spreadsheet lets you chart cumulative totals and averages while working in a presentation. WordPerfect has fewer spreadsheet

functions, Persuasion limits you to adding columns and rows, and Freelance has no such functions.

TONS OF GRAPHIC-IMPORT FILTERS Adding a corporate logo to your presentation shouldn't be as painful as trimming the budget. Regardless of where the graphic file originated, it needs to be compatible with your presentation program—or you're stuck cutting and pasting from the Windows Clipboard. Freelance, with its wide range of graphic filters, can handle almost any file. PowerPoint doesn't support as many types of graphics files as Freelance, but it lets you work magic with those it does import. For example, PowerPoint allows you to change any color on an imported bitmap. WordPerfect Presentations also imports a wide variety of graphics files, but we found its color quality to be unusually sensitive to the type of video card installed. For instance, when we imported graphics—especially bit-mapped images—colors changed or were degraded.

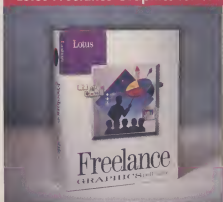
EFFECTIVE IMAGE MANIPULATION You can't have a picture-perfect presentation without perfect pictures. Once you've imported a graphic, you'll want to touch it up. For sheer power, nothing can touch the image-editing tools in WordPerfect Presentations. It lets you edit bit-mapped images one pixel at a time; even better, it allows you to convert a bitmap to a vector image, which—unlike a bitmap—can be easily stretched or resized without distortion.

Sometimes, when you import and display bit-mapped files in presentations, they end up surrounded by an unwanted white rectangle that covers up the slide's background. Freelance, unlike any other program we tested, allows you to make that white area transparent.

PowerPoint also wins praise for the way it handles imported graphics. It gives you a surprising number of graphical tools with which you can add special effects such as shadows and colored outlines.

IMPORTING OUTLINES It's a tremendous time-saver when, with one mouse click, you can turn a well-crafted outline into the core of an effective presentation. Persuasion is notable on this score because it allows you to directly import outline files from eight word processors, including Word for Windows and WordPerfect. PowerPoint, Freelance, and WordPerfect also import outline files, but they typically accept outline files only from word processors sold by the same company. Harvard Graphics does not directly import outlines at all.

Lotus Freelance Graphics for Windows 2.0



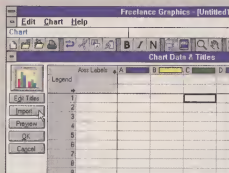
Freelance Graphics, with its powerful outliner, unbeatable tools for importing spreadsheet data, and versatile graphics capabilities, is the best all-around choice for the team presentation.

For more information, see "Showstopping Slits," page 168.

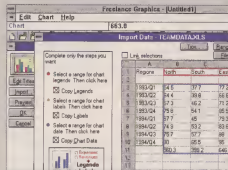
Round Up Data with One-Step Import

Only Freelance Graphics works directly with spreadsheet files.

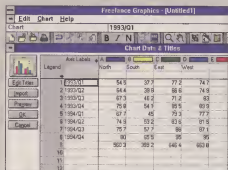
Freelance Graphics



Step 1. In Freelance's doto form, select the Import option to bring in spreadsheet data without exiting Freelance.

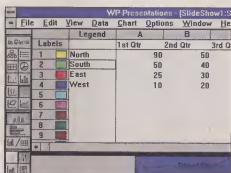


Step 2. Freelance opens your file and you select the spreadsheet elements, including legends, labels, and doto, to import.

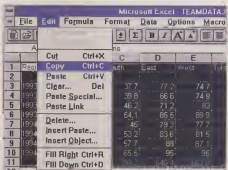


Step 3. Freelance closes the spreadsheet and places the selected information in the proper places in its own data farm.

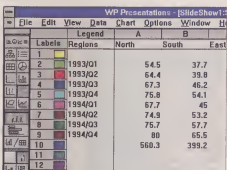
WordPerfect Presentations



Step 1. To bring spreadsheet data into other presentation programs, such as WordPerfect Presentations, start working in the data form.



Step 2. Switch to Excel, open the desired spreadsheet, select the doto you want, then copy it to the Windows Clipboard.



Step 3. Switch back to WordPerfect and paste in the data. Legends and labels often need to be placed properly.

THE ULTIMATE

YOU'VE PREPARED FOR
a year for this moment.
*Everyone who's anyone is in
the audience. You need flying logos,
dancing bar charts, and profit
projections that sing in four-part
harmony—in short, enough sizzle to
earn an Oscar. Do you have what it
takes to bring down the house?*

SOPHISTICATED CHART EDITING How do you melt an accountant's heart? With a breathtakingly beautiful chart. When you're after the ultimate visual effect, you need ultrasophisticated charting tools that let you control the look and feel of even the smallest detail. You want to place the legend just so, customize the color of each pixel, explode each slice of a 3-D pie, and fill bars with bit-mapped images. Harvard Graphics stands out for its depth of chart-manipulation features. Unlike PowerPoint and WordPerfect Presentations, Harvard lets you create charts that are easy to edit; to move the legend or explode several pie slices, for example, you simply click on the object and move it—there's no need to go into a separate program module.

SCREEN SHOWS Are you in control, or is your presentation running you? If the person you're trying to impress interrupts the show with a what-if question, you'd better be able to stop the presentation on a dime. When superb maneuverability is your goal, Harvard handles best. Its powerful Hypershow feature allows you to create buttons on your slides that anticipate interruptions. You can jump to a specific slide, launch

an external program, even play a sound or video file.

Freelance also allows for the creation of buttons within a screen show, although this feature isn't as powerful as Harvard's Hypershow. For example, you can initiate an object linking and embedding action by pressing a button in Harvard, but not in Freelance. Harvard also lets you play a wider variety of multimedia clips from a button.

Harvard, like PowerPoint and Freelance, has a handy chalk feature—you can highlight a point by using the mouse to draw on a slide during a screen show. Harvard also includes an especially forward-looking feature, called conferencing, that lets you give onscreen presentations to other users over a network.

While Harvard takes top honors, WordPerfect wins points for its screen-show innovations. Before putting a transition between slides, you can preview the effect on a thumbnail of the slide—a feature that makes it easier to design screen shows. PowerPoint has a similar feature, but you preview the transitions on a sample slide rather than the actual one. Freelance previews transition effects using the full screen.

STRONG MULTIMEDIA EFFECTS Even in the stuffiest boardroom, they want their MTV. Big productions require eye-popping special effects to keep your audience awake and attentive. Overall, Harvard comes closest to giving you a full multimedia studio for your presentations, with support for WAV and MIDI sound files and AVI video-clip formats. It even includes a separate program, Harvard F/X, for creating graphics with special effects such as mirroring and embossing.

When you want your presentation to come through loud and clear, WordPerfect makes it easy. Like Freelance and Harvard, it lets you add PC sound files to your presentations. And only with WordPerfect can you add tracks from a music CD as well, in addition to recording sounds from within WordPerfect itself. Freelance also does an excellent job of handling sound: A sound icon is always available, which lets you quickly add a sound clip to any slide. If you've got a sound board on your PC, you can record, pause, move forward and backward, and adjust the volume, all from within Freelance. But it still doesn't match Harvard's ability to include multimedia within presentations. If multimedia is on your gotta-have-it list, scratch PowerPoint and Persuasion—they don't directly do multimedia at all.

Software Publishing Harvard Graphics 2.0 for Windows

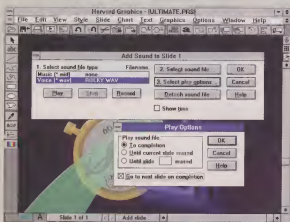


When the big money's on the line, Harvard Graphics is the persuader you want at your side. For rich visuals, dazzling sound and video, and the ultimate in flexibility, it's unbeatable.

For more information, see "Showstopping Stats," page 168.

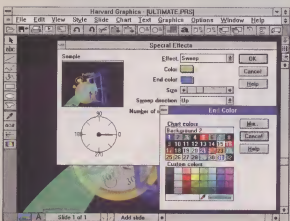
Multimedia Pumps Up the Volume

Sound, video, and special effects will make your message come alive.



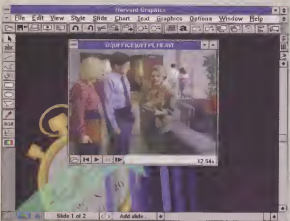
SOUND OFF, ONE-TWO-THREE

With Harvard Graphics, adding sound is a simple matter of stepping through dialog boxes to select sound clip and play options. Sound, which also can be recorded directly from within the program, will play during the screen show without your having to click an special buttons or icons.



LIGHTS, CAMERA . . .

If you want your images to spin, fade, or sweep across the screen, Harvard Graphics provides the tools that make it easy. Transitions? Just click on the beginning and end colors and Harvard fills in everything in between. Rotation? Grab the wheel in the dialog box and make your images spin.

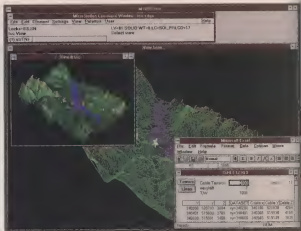


ACTION!

And now for the grand finale. Harvard lets you launch video, animation, and other applications directly from your custom slide show. Here we created a button that launches Harvard's included video player. During the screen show, simply click to call up the preselected clip.



Rendering. Visualization and flythroughs – at your fingertips! MicroStation offers photo-realistic rendering to every designer, right in the software. It's easy to make your image reflect your imagination.



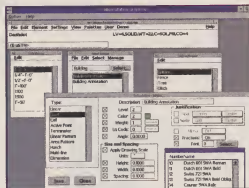
Windows. It walks and talks Windows. Behind MicroStation lies the user-responsive programming you look for in good Windows software. Version 5 gives you the ultimate in integration of CAD, engineering, and business applications.

MORE POWER TO YOU.



Modeling. Model any surface you can imagine in MicroStation. NURBS surface modeling combined with 3D Boolean operations gives you astounding flexibility in creating and modifying freeform models.

Read & write
AutoCAD .dwg



Drafting. MicroStation gives you first-rate drafting power – without the limitations of old technology. Enjoy the advantages of contemporary features like associative patterning/batching, plot preview, standard text editing aids, and context-sensitive Hypertext help.

Workspaces. Choose the design environment that matches your profession or your CAD expertise – even AutoCAD. Complete with custom interfaces, drafting styles, and design environment management. CAD has never been so streamlined!



Usability. What does computer-aided drafting have to do with the way you think? Everything. MicroStation software works for you. It understands the drafting process so well that it infers what you'll do next.

Graphical User Interface.

MicroStation's easy-to-use interface includes pull-down menus, dialog boxes, tear-off tool palettes, and tool settings window. Choose your interface — Windows or Motif — on any platform. **Transparent Modeless Operation.** The software supports the way you naturally work, maintain-

ing command execution while you fine tune: change element attributes or command parameters, manipulate views, change the dimensioning system, and more.

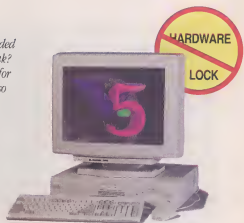
Powerful View Manipulation. MicroStation supports up to eight active views that can be moved, sized, and overlapped to fit your design. Zoom and area at any scale. Move around your design fast with built-in dynamic panning.

Workspace Editor. Tailor pull-down menus, dialog boxes, and tool palettes — even disable commands — with a graphically oriented toolset for customizing your chosen interface. **Text Capabilities.** A convenient text editor lets you easily edit single-line or paragraph text. Choose from TrueType, PostScript, AutoCAD SHX, and

MicroStation fonts. ASCII text files can be imported and exported. **Multiple Undo/Redo Commands.** Undo mistakes and perform "what-if" designs in a flash with unlimited undo and redo. **Plotting.** Plot raster and vector information by view or defined areas, at any scale. Visually preview the plot before plotting, saving time and materials. **Online HELP.** MicroStation's HELP remains active, tracking the command you're currently using, so there's no searching through manuals for assistance.

Associative Patterning and Hatching. Associate patterning with graphics. Change graphics and the patterning updates. Flood-fill hatching/patterning intelligently fills an area, detecting boundaries and holes with a single pick. **Associative Dimensioning.** Dimensions are associated with the geometry, not with a point in space, so that when you change the geometry, the dimensions automatically update. **Custom Line Styles.** Create space-saving custom line styles and place railroad tracks, trees, isobars — anything — just as you would place a line.

Multi-lines. Define line string elements comprising up to 16 parallel lines of varying symbology and store them in a style library for use. Architects can use multi-lines for fast and easy placement and intersection cleanup of walls and partitions. **2D Boolean Operations.** Quickly modify, measure, and hatch multiple 2D shapes with integrated Boolean operations. **Mass Properties.** Calculate area and mass of your model: surface area, volume, mass, centroid, moments and products of inertia, principal moments and directions, and radii of gyration. Define relationships among graphic entities with intuitive drawing modes such as tangent, parallel, perpendicular, midpoint, intersection, and end-to-end. **Dimension-driven Symbols.** Based on established relationships, you can assign variables to dimensioned graphics and save the graphics as cells



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Usability Breeds Content

Good news! Four out of five earned our coveted seal of approval.

How often will you end up using a presentation graphics program? Unless you crank out slides for a living, the answer is probably not more than five or six times a year. But when you do, you need fast results. That's why usability test results are so significant for these programs.

We brought the five top Windows presentation programs into PC/Computing's Usability Labs and introduced them to 12 real business users. We asked each tester to create a screen show, complete with transition effects, printed handouts, and speaker's notes. Then we asked them to rate the

usability of each program in eight key areas.

The results weren't even close. Freelance Graphics for Windows

was the runaway winner with a near-perfect score. Testers went out of their way to praise its intuitive interface. One tester noted, "If my boss had said, 'Do this job—and you

only have two hours,' this is the only one that could do it."

WardPerfect Presentations was a distant second, earning high marks for just about everything except its ability to edit charts. Testers complained when they couldn't work with a chart directly after they

had created it; then they had to use a separate module.

PowerPoint scored high in all areas except for its charting features, which were judged the worst among all the programs. For special effects, however, PowerPoint was at the top of the heap, outscoring even Freelance.

Harvard Graphics for Windows earned average scores in most categories but was outstanding in none. Aldus Persuasion, the granddaddy of presentation programs, was a usability flop, especially in documentation.

One candid usability tester summed it all up: "When I'm up there making a presentation, it's my company and my reputation at the line. I want everything to be perfect. If a piece of software can't do what I want, I'll throw it away."



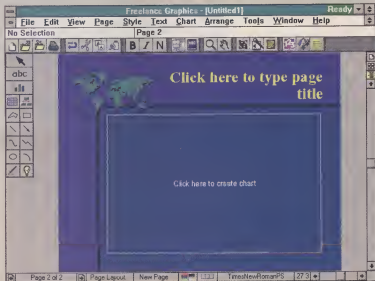
Distilled to a single rating, usability test results decide who earns the seal.

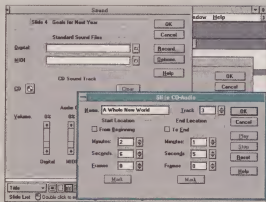


98.9

FREELANCE GRAPHICS FOR WINDOWS

This program won't let you stumble. Our usability winner tells you precisely what to do to create a slide. Freelance was rated the most usable product in seven of eight tests, often by a wide margin.

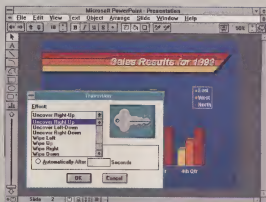




86.8

WORDPERFECT PRESENTATIONS

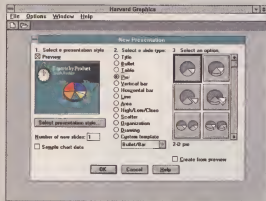
Even in its prerelease version, this newcomer was consistently usable. The sound-effects capability is a strong suit, as is its preview screen, which allows you to view eight master templates at once.



83.6

POWERPOINT

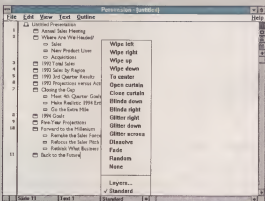
Take the guesswork out of screen shows. PowerPoint lets you preview transitions in a thumbnail view. Testers likewise lauded the ability to easily turn a bulleted chart into a dynamic series of slides.



80.4

HARVARD GRAPHICS

They borrowed from the best. The screens that guide you through the presentation process are straight out of Freelance. Harvord's highest marks come for documentation, even though we tested a prerelease version.



74.8

PERSUASION

Aldus has its work cut out in the new version, which will sport a new interface. Its outline, which lets you add special effects via menu choices, earned a decent score, but otherwise Persuasion just doesn't measure up.

Pinch Hitters

Cheap, specialized, and artful alternatives.

If one of the five Windows presentation programs we tested isn't a perfect match for your needs, try these alternatives on for size.

BUDGET PRESENTATIONS

Anyone who feels forced to give up advanced presentation features because of a tight budget should look at Bravo (\$79, Alpha Software, 800-852-5750). This Windows program gives you an outliner, a slide sorter, the ability to edit directly on slides, and a variety of master styles and slide templates. What you give up is sophistication. Screen-show effects are limited, and the master styles won't knock your socks off. But for quick-and-dirty presentations, it's worth its price.

Circle No. 663 on Reader Service Card

STATISTICAL

PRESENTATIONS Stanford Graphics (\$495, 3-D Visions, 800-729-4723) is no match for Freelance when it comes to screen shows or ease of use, but it's a number cruncher's dream come true. It provides a dizzying array of chart types, including many technical, business, and statistical charts that you'll find in no other presentation package.

Circle No. 664 on Reader Service Card

DeltaGraph Professional for Windows (\$495, DeltaPoint, 800-367-4334) also includes chart types you won't find in most packages, and its data sheet allows you to use mathematical formulas. But DeltaGraph is not as easy to use as the top business programs, nor does it have their presentation oomph. And for statistics freaks, it can't compare to the number-crunching powerhouse, Stanford Graphics.

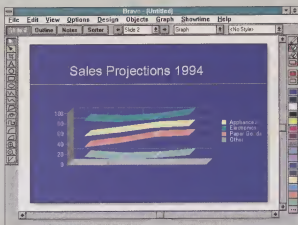
Circle No. 665 on Reader Service Card

ARTFUL PRESENTATIONS

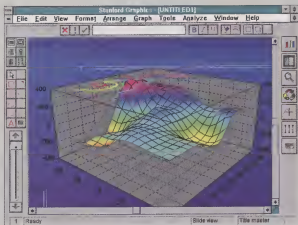
If you want a collection of paint and illustration tools to use alongside a presentation program, look at CorelDraw 4.0 (\$595, Corel, 800-836-3729). Though it doesn't guide you seamlessly through creating a presentation or include an

outliner or slide sorter, this illustration program includes charting and screen-show modules. It's especially useful for anyone who wants to create full-blown graphics and animation, in addition to presentations.

Circle No. 666 on Reader Service Card



ALPHA BRAVO This \$79 package provides presentation power on a budget, but don't expect the sophistication or ease of use found in full-featured programs.



STANFORD GRAPHICS As much a data-analysis tool as a presentation package, Stanford is the one to buy for technical and statistical charting.

**IBM**

There was a time when your worst technical nightmare wouldn't go away till the morning after.

Aaron Matas
Product Support Specialist
IBM Personal Systems
HelpCenter



IBM Personal Systems HelpCenter®
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Aaron Matas knows from personal experience that emergencies don't keep bankers' hours. That's why our HelpCenter stays staffed and ready around the clock. So if a system goes down, you won't have to wait till sometime the next day to find out if it's your hardware,

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L-R: Alice Robinson, Gregg McGhee, Jeff Herman and Beverly Whitman, Custom Build Technicians, IBM Personal Computer Group



425SX/S

ValuePoint SpaceSaver

- Compact size: 14.2" W x 4.8" H x 16.5" D
- 3 slots (includes 1 VESA Local Bus slot!) and 3 bays
- Also available in medialess (no drives) configuration to function as an economical LAN client workstation!



433DX/D

ValuePoint Desktop

- Plenty of room to grow: 5 slots (includes 1 VESA Local Bus slot!), 5 bays
- A super combination of speed, power, upgradability and expandability!



466DX2/T

ValuePoint Mini-Tower

- Convenient, compact Mini-Tower processor case measures 9.5" W x 16.8" H x 16.9" D
- Enormous room for growth: 8 slots (includes 1 VESA Local Bus slot!), 6 bays
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- Zero Insertion Force (ZIF) socket for fast, easy processor upgrades.

| ValuePoint SpaceSaver | 425SX/S | 433SX/S | 433DX/S | 433DX/S |
|-----------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| Processor | i486SX/25 MHz | i486SX/33 MHz | i486DX/33 MHz | i486DX/33 MHz |
| Hard Drive/Memory | 120MB/4MB | 120MB/4MB | 120MB/4MB | 245MB/8MB |
| Diskette | 3.5" | 3.5" | 3.5" | 3.5" |
| Display | 6312 14" SVGA NI | 6312 14" SVGA NI | 6312 14" SVGA NI | 6314 14" SVGA NI |
| Operating System | IBM DOS & WINDOWS™ | IBM DOS & WINDOWS | IBM DOS & WINDOWS | OS/2® |
| Price* / IBM Credit Lease** | \$1,579 / \$57 per month | \$1,779 / \$64 per month | \$2,029 / \$73 per month | \$2,469 / \$89 per month |
| ValuePoint Desktop | 425SX/D | 433SX/D | 433DX/D | 466DX/D |
| Processor | i486SX/25 MHz | i486SX/33 MHz | i486DX/33 MHz | i486DX/66 MHz |
| Hard Drive/Memory | 120MB/4MB | 120MB/4MB | 120MB/4MB | 245MB/4MB |
| Diskette | 3.5" | 3.5" | 3.5" | 3.5" |
| Display | 6312 14" SVGA NI | 6312 14" SVGA NI | 6312 14" SVGA NI | 6312 14" SVGA NI |
| Operating System | IBM DOS & WINDOWS | IBM DOS & WINDOWS | IBM DOS & WINDOWS | IBM DOS & WINDOWS |
| Price* / IBM Credit Lease** | \$1,659 / \$60 per month | \$1,859 / \$67 per month | \$2,099 / \$76 per month | \$2,779 / \$100 per month |
| ValuePoint Mini-Tower | 433DX/T | 466DX/T | 466DX/T | 466DX/T |
| Processor | i486DX/33 MHz | i486DX/66 MHz | i486DX/66 MHz | i486DX/66 MHz |
| Hard Drive/Memory | 340MB/4MB | 527MB/4MB | 527MB/4MB | 527MB/8MB |
| Diskette | 3.5" | 3.5" & 5.25" | 3.5" | 3.5" |
| Display | 6318 14" SVGA NI | 6318 14" SVGA NI | 6319 15" SVGA FS NI | 6319 15" SVGA FS NI |
| Operating System | IBM DOS & WINDOWS | IBM DOS & WINDOWS | IBM DOS & WINDOWS | OS/2 |
| Price* / IBM Credit Lease** | \$2,579 / \$93 per month | \$3,499 / \$126 per month | \$3,599 / \$130 per month | \$3,789 / \$137 per month |

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Angela Hardy
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We'd like to compare our color prints to theirs, but we don't have all day.

When you can get photo-like output like this from a dye-sublimation printer, who wants to wait? Especially when you can use that vivid, continuous-tone color for everything from overhead transparencies to proofing your layouts before going to film.

That's why we made the new Phaser™ IIsox the fastest Adobe™ PostScript™ Level 2 dye-sublimation printer around. Its powerful RISC CPU processes large scanned images at about the same speed as a dedicated raster printer, but with all the convenience and shareability you've come to expect from a network PostScript printer.

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Call us today for a free sample print. Our number is 800/835-6100, Department 29-A.

For faxed information, call 503/682-7450 and ask for document 1231.



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|--|---|---|--|--|---|
| Phone | | | | | |
| Reader service no. | 667 | 668 | 669 | 670 | 671 |
| FEATURES | | | | | |
| Price | \$495 | \$495 | \$495 | \$495 | \$495 |
| Disk space required (minimum/full) | 8MB/18MB | 8MB/21MB | 2MB/10MB | 5MB/14MB | 4MB/20MB |
| No. of master styles | 65 | 31 | 7 | 160 | 64 |
| No. of chart styles | 108 | 88 | 83 | 1 | 192 |
| OUTLINER | | | | | |
| Drag-and-drop slide moving | • | • | • | • | • |
| Collapse and expand levels of text on slides | • | • | • | ○ | ○ |
| Set charts in outline | ○ | • | • | ○ | • |
| DATA IMPORT | | | | | |
| 1-2-3 for Windows | • | • | • | ○ | • |
| 1-2-3 for DOS | • | • | • | • | ○ |
| Excel | • | • | • | • | • |
| Quattro Pro | ○ | ○ | • | ○ | • |
| DBF | • | ○ | • | ○ | ○ |
| Preview graphics | • | ○ | ○ | ○ | • |
| No. of clip-art images | 552 | 536 | 100 | 573 | 1,010 |
| SCREEN SHOWS | | | | | |
| Directly play sound and video | • | • | ○ | • | • |
| Launch programs from screen show | • | • | ○ | ○ | ○ |
| SUMMARY | | | | | |
| Pros | Easy to use; packed with presentation power. | Deepest charting capabilities; best screen shows. | Good outline. | Excellent import capabilities and special effects. | Simple to use; excellent graphic manipulation. |
| Cons | Multimedia could be beefed up. | Not the easiest to use. | Hardest of the programs to use. | Charting features could use help. | Poor chart editing. |
| Verdict | Best of the bunch for everything except multimedia. | For industrial-strength charting, screen shows, and multimedia. | Wait until the next version. | Useful for those who work with imported graphics. | Best for using sound in presentations. |
| Best Team Presentation Best Rush Job | | Ultimate Sound And Light Show | | • YES • NO | |

Bring 24-bit Color Display To Your PC



8-bit display



24-bit display

Free With Microtek's ScanMaker II or IIxE

If your current VGA display system looks like the image on the left, only 256 colors are being displayed. It's not your monitor, but the display card that limits the number of screen colors available.

The image on the right gives you an idea of how a 24-bit display card can sharpen and enhance your scanned images.

Now, for a limited time, you can upgrade your monitor's performance with a **Free WindowsVGA 24 (8500 Series)** card by Genoa Systems when you

purchase a Microtek ScanMaker®II or IIxE 24-bit flatbed color scanner for your PC.

Together, the Microtek ScanMaker II and the Genoa display card (both "Top Rated" products by *PC Computing* magazine) allow you to scan and display over 16.7 million of the most vivid, photorealistic colors available.

And the ScanMaker II also comes with Adobe Photoshop 2.5 LE for Windows (ScanMaker IIxE comes with the full version of Photoshop 2.5 for Windows) the new standard in image editing making the ScanMaker even more valuable.

Available for around \$950 from your authorized Microtek reseller, the ScanMaker II, Adobe Photoshop 2.5 LE and Genoa display card will turn your PC into an expert graphics workstation.

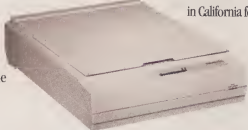
But hurry! This offer ends September 30, 1993. Call your reseller today or call Microtek at 1-800-654-4160 or at 213-321-2121 in California for more information.



The Genoa 24-bit display card by the Cirrus Logic CL-GDS-436 GDI accelerator.



Every ScanMaker II comes with Photoshop II. Every ScanMaker IIxE comes with the full version of Photoshop.



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Circle 185 on reader service card.

Persuasive PRINTOUTS

**What good is color if it's locked in your monitor?
Turn dull documents into powerful presentations.**

BY PEGGY WALLACE

People respond to color. Whether it's a ticket-red Camaro, a glittering green emerald, or a brightly striped snake, the medium of color draws us to objects and conveys implicit messages. The Camaro screams speed, while the emerald whispers wealth. And the snake? That's nature-speak for danger. Color conveys more shades of meaning than can words alone. But in the business world—where your message can translate into crisp, green dollar bills—we have to contend with a final color barrier: the printed page.



It's one thing to create a high-impact presentation on the computer screen,

and another to produce those same colors in a form to hand out. Today's color printing problems—faithful color reproduction, output speed, and price—are no longer obstacles to quality output. Now even

Color Printers

DYE SUBLIMATION

GCC Technologies Colortone
Kodak ColorEase
Seiko Professional Colorpoint PSH
Tektronix Phaser II SDX

THERMAL WAX TRANSFER

CalComp ColorMaster Plus 6613 PS
Fargo Primero
General Parametrics Spectrostar Q40
QMS ColorScript 210

Seiko Colorpoint PSX Model 4
Tektronix Phaser 200i

SOLID INK

Brother HS-1PS
Tektronix Phaser III PXi

INK JET

Canon BJC-800
Hewlett-Packard DeskJet 1200C
Lexmark Color Jetprinter PS 4079



Kodak ColorEase

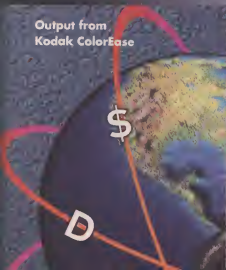


Tektronix Phaser II SDX

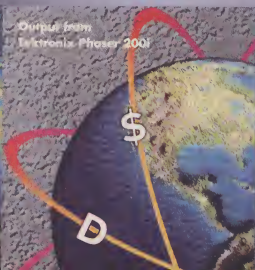


Tektronix Phaser 200i

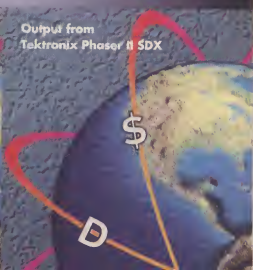
Output from
Kodak ColorEase



Output from
Tektronix Phaser 200i



Output from
Tektronix Phaser II SDX

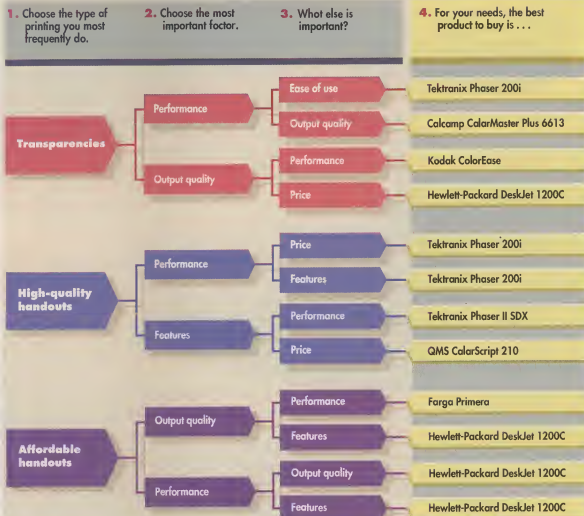


the most advanced desktop color printers are affordable. And to satisfy your color printing needs, vendors offer a spectrum of technologies, from dye sublimation to ink jet techniques. (For more on these technologies, see "Five Ways to Put Color on the Page," page 174.)

Businesses have very different print needs. Some want overhead transparencies. Others demand superb reproduction. And some just want to spice up handouts with eye-grabbing color. We evaluated 15 color printers, gauging how well they satisfy these three printing needs.

PC/COMPUTING DECISION MAKER

Choose from a spectrum of printers to fit your needs.



COLOR PRINTER

Tektronix Phaser 200i tops them all.

When you have to do it all, you have to have the Tektronix Phaser 200i. This thermal wax-transfer printer produces crisp, clean transparencies that shine, as well as dazzlingly bright handouts—at red-hot speed. Best of all, it comes with a price tag that won't break the bank.

Tektronix Phaser 200i • Tektronix • 26600 Southwest Pkwy.
Wilsonville, OR 97070-1000 • (800) 547-8949, (503) 685-3067 • \$5,995



No doubt you've experienced the limitations of Windows.



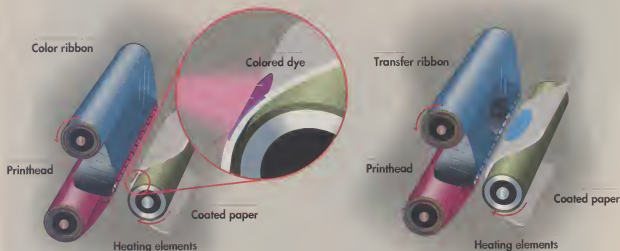
Too slow. Too cluttered. And a little klutzy. Clearly, Windows has its imperfections. Fortunately, they're easy to fix. All you need is PC Tools™ for Windows software. It makes Windows faster, simpler, more fun—while it protects your data. Infoworld concluded, “with the release of PC Tools for Windows, Central Point has in a single stroke grabbed the top spot as best Windows shell from Norton Desktop.” We couldn't have said it better. And at \$99 (from participating dealers) the advantages of PC Tools for Windows are really hard to ignore. If you're now using Norton Desktop, you can upgrade for only \$69. Want more information? Just call 1-800-695-0678.

Central Point Software

Circle 188 on reader service card.

Five Ways to Put Color on the Page

Print technology makes a difference—affecting image quality and business use.



Dye Sublimation

The colored dye on the ribbon transforms from a solid into a gas, which is absorbed by the coated paper in four passes, one for each color. The printhead can vary its temperature, with more heat transferring more dye on the page.

Pros: Highest-quality output of the color print technologies; continuous-tone color and high color intensity; prints equally well to coated paper and transparencies.

Cons: Requires special paper; prints slowly; expensive technology.

Average price: \$8,000 to \$10,000.

Presentation uses: Transparencies; near-photographic images.

Thermal Wax Transfer

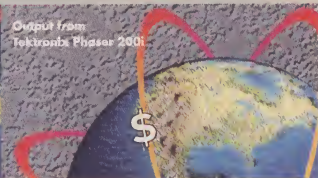
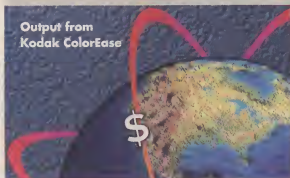
In thermal transfer, heat from the printhead melts the colored wax from the transfer ribbon and fuses it onto coated paper. The different colors that make up the transfer ribbon are transferred in consecutive passes.

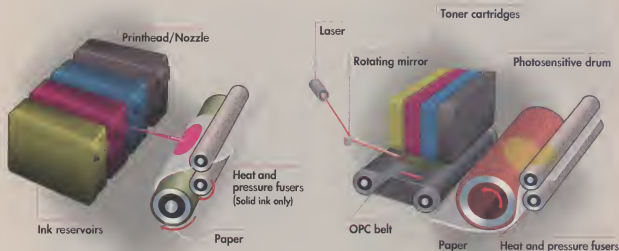
Pros: Rich, highly saturated colors; fast print times; good for paper output and transparencies; less expensive than dye sublimation and solid ink technologies.

Cons: Requires special coated paper; produces dithered halftone images.

Average price: \$5,000 to \$7,000.

Presentation uses: Full-page color images; glossy documents; bright graphic images.





Solid Ink

Solid crayons of ink are melted in their respective reservoirs, and the melted ink is sprayed onto the page, where it immediately solidifies. High-pressure rollers flatten and fuse the dots of ink to the page.

Pros: Prints to plain paper; high-quality output; ink images dry immediately, preventing smearing or bleeding of color.

Cons: Lamination required for presentation-quality transparencies; transparency output poor; slow print times; more expensive than thermal transfer and ink jet technologies.

Average price: \$10,000.

Presentation uses: High quality; plain-paper handouts.

Ink Jet

Ink jet printers use liquid ink that is stored in a series of cartridges and sprayed onto the paper. The process of applying ink to the page parallels the process found in solid-ink technology.

Pros: Good business-quality output; can print to plain paper; quiet operation; least expensive technology.

Cons: Transparency output quality not as high as with thermal transfer; produces dithered halftone images; coated stock required for presentation-quality handouts; slow.

Average price: \$1,500 to \$4,000.

Presentation uses: General business documents and graphics; proofing device for presentation documents.

Color Laser

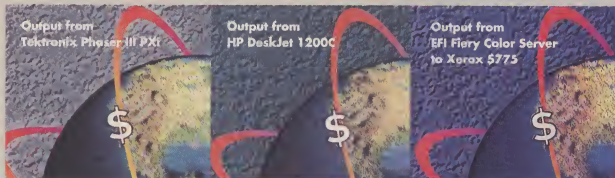
A laser beam marks the image on the organic photoconducting cartridge (OPC) belt in four passes. The OPC belt moves under the toner cartridges, picks up the color, and applies it to the drum—once for each color. A voltage drop releases the dry toner in one pass, where it's fused on.

Pros: Prints to plain paper; high-resolution printing; printed pages won't crack or melt as can happen with other color technologies.

Cons: Not yet widely available; high prices.

Average price: \$13,000.

Presentation uses: Plain-paper business documents and graphics.



TRANSPARENCIES

YOU TRAVEL, YOU TALK, and most of all, you sell. You plan to give your clients some fancy handouts, but not yet. You want them to look at you, not down at the table. Since you're built for speed, you can't lug around laptops and panels—you need great-looking transparencies.

HIGH-QUALITY TRANSPARENCIES You need to captivate your audience, and dull colors and muddy graphics won't cut it. Among our 15 tested printers, the dye-sublimation and thermal wax-transfer printers deliver the quality on transparencies that we look for—crisp, clear text, no smudges or stray colors, vibrant tones, and a smooth and consistent background. Transparency quality drops considerably with the solid ink and ink jet printers, because the density of ink that these printers use makes it difficult for enough light to pass through the projector, marring the image reproduction. The files output from the ink-based printers we tested often looked fuzzy or splotchy. (The Hewlett-Packard DeskJet 1200C, however, is a notable exception; its output is smooth and consistent, with rich color and clear text. But it still doesn't compete with the dye-sublimation and thermal transfer printers.)

During testing, each printer output a file of three Microsoft PowerPoint images as well as two CorelDraw files to transparency stock. The PowerPoint files contained dark solid backgrounds, white or

yellow text, and bar graphs in a variety of colors. Our CorelDraw file consisted of colored text with a transparent background, and solid color squares against a white background. The PowerPoint files allowed us to judge the quality and smoothness of bold background colors, while the CorelDraw files illustrated the printers' ability to produce crisp, clean-colored text and solid blocks of colors.

The CalComp ColorMaster Plus 6613 PS produces very rich colors that—when projected onto a wall—stand out more vividly than those from the other thermal transfer printers tested. While not as speedy as the Tektronix Phaser 200i and a few other thermal transfer printers, CalComp's 5.5-minute PowerPoint output to paper time is very respectable, and its transparency output is better (it also output quickly to paper stock). You'll pay \$1,000 extra for all that, though—\$6,995 compared to \$5,995 for the Tektronix Phaser 200i.

Still, no printer holds a candle to the ColorEase from Kodak. This dye-sublimation printer easily tops every other printer in quality of transparencies. Its colors are stunning in their richness and smoothness. And while text is often the downfall of high-quality color printers (other than those using solid inks), the ColorEase produces text on transparencies that appears crisp and bright. This printer's attractive output is helped by the high-quality paper and transparency stock that Kodak makes available; the company's expertise in film reveals itself in its paper.

SPEEDY PERFORMANCE The best output in the world won't mean a thing if you can't print your files in time for your presentation. While most of the printers produce transparencies more slowly than they do paper output, the difference can range from a few seconds to 12 minutes or longer. Often the gap is caused by the longer drying time that transparencies require. In any case, an office that spends much of its time creating and giving presentations needs a printer that can churn out transparencies at a reasonable rate while maintaining high quality and ease of use.

The thermal transfer printers produced transparencies the fastest—about 1.5 to 2 minutes per transparency. Other technologies took up to 10 minutes per transparency in our tests. (The thermals were also quickest in outputting to

Kodak ColorEase



Kodak's ColorEase captivated us with stunningly rich and smooth color as well as crisp, bright text. And it was the fastest dye-sublimation printer we tested.

For more information, see "The Cold Facts on Color Printers," page 192.

Clearly Superior, But Worth the Price?

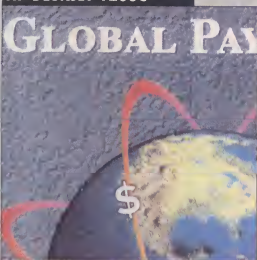
To get Kodak's brilliant transparencies, you pay a hefty \$6,300 more than the HP.

KODAK COLOREASE



SHARP DETAIL, CRISP TEXT, and vibrant color with subtle gradations mark the ColorEase's outstanding image quality.

HP DESKJET 1200C



REMARKABLY INEXPENSIVE, the HP DeskJet produces acceptable images that, compared to the ColorEase, appear faded and muddy.

paper.) The only thermal transfer printer that didn't live up to its category's standard of quickness is the Fargo Primera, which is much pokier because it has no onboard processor or memory. The Tektronix Phaser 200i was the fastest color printer tested—it came in first on every speed test. Its transparency samples averaged only 1.5 to just over 2 minutes to output, which is amazingly fast for color printers. And, unlike several other printers that have hard-to-handle ribbon rolls, the Phaser 200i is easy to set up for printing to transparencies. The quality of its output is also quite good.

Dye-sublimation printers are notoriously slow, and while the ColorEase's 12-minute average time for printing the PowerPoint file to transparency doesn't tear up the tracks, it was certainly faster than the other dye-sublimation printers, which took between 19 and 23 minutes. The ColorEase's 5-minute average time to print the CorelDraw file to a transparency, on the other hand, was truly speedy for any type of printer.

THE BEST PRICE If you want high-quality transparencies but are scared by Kodak's \$7,999 price tag, you're in luck. Fortunately, the printers best suited for producing high-quality transparencies accommodate various budgets without sacrificing output quality or speed. For \$1,000 to \$2,000 less, you can get the \$6,995 CalComp or \$5,995 Tektronix thermal transfer printers. Both produce rich, bright colors on transparencies at relatively quick speeds.

With its \$1,699 price tag, the DeskJet 1200C from Hewlett-Packard comes up the winner for affordable, acceptable-quality output. While the HP offers the best color of the lot for printers under \$4,000, the output still just doesn't have the rich smoothness of the higher-priced printers, and its speed—12.5 minutes to print the PowerPoint file—is slower than the thermal transfers but more competitive than the Kodak. Nonetheless, if high-quality output is important, you're best off spending the extra bucks and going with a printer like the Kodak ColorEase.



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HIGH-QUALITY HANDOUTS

YOU'VE LEFT THE audience speechless with your presentation. The crowds are ready to convince their CEOs, CFOs, and COOs that their companies can't live without your services. Clinch the deal with a color handout that screams creativity, know-how, and business savvy.

GREAT-LOOKING OUTPUT If your presentation doesn't make a lasting impression, at least your beautiful output will. If you need no-nonsense, high-quality, graphics-rich output, check out dye-sublimation printers—they use the most advanced color print technology available for the desktop—and solid ink printers, which can produce high-quality output on plain paper rather than the special glossy stock that other color printers require. If your presentation has lots of text, a solid ink printer, such as the Tektronix Phaser III PXi, is a better choice, since dye-sublimation printers tend to make text look muddy.

We received the highest-quality output on paper from the Tektronix Phaser II SDX. The Tektronix Phaser III PXi produced good colors as well, though they weren't as smooth as those from the Phaser II SDX and had purplish undertones. Seiko's dye-sublimation printer, the Professional Colorpoint PSH, had good output, but its colors and text were cloudy compared to the Phaser II SDX's output performance.

The thermal transfer printers produce quality output that's one notch below that of the dye-sublimation

and solid ink units. Among the thermal transfer printers, the QMS ColorScript features good color saturation and registration as well as impressive overall print quality. But if you compare its output with that from the dye-sublimation Seiko Professional Colorpoint PSH, you'll see that the overall color isn't as crisp. The Tektronix Phaser 200i, another thermal transfer printer, produces excellent output, on a par with that of the Seiko Colorpoint PSX.

When you look at the lower cost of the ink jet printers, they're attractive. However, when it comes to output quality, you get what you pay for—the ink jet's output doesn't match that of other products. The colors aren't as rich, and the contrasts aren't as defined as with higher-priced printers. But if you're set on getting an ink jet printer, go with the HP. Its paper output quality is head and shoulders above that of the Canon and Lexmark.

Some printer output fell short because it wasn't as smooth or crisp as that of the top contenders. The output from the General Parametrics Spectrastar Q40 printer is grainy, and the color quality isn't consistent from edge to edge. The Brother HS-1PS's output is splotchy, so background colors aren't consistent.

If you're looking for the highest-quality output on paper, go with the Tektronix Phaser II SDX. It's pricey, but isn't the best output worth it? If you need to spend less and can sacrifice some quality, then the QMS ColorScript is a solid choice.

THE TOP PERFORMANCE Three thermal transfer printers displayed commendable print speeds. The Tektronix Phaser 200i, the QMS ColorScript 210, and the Seiko Colorpoint PSX Model 4 ranked first, second, and third, respectively, in every performance test we ran. All three printers produced our 3-page PowerPoint file in under 4.5 minutes. The closest contenders were the Spectrastar and the CalComp, which output the same file in a little over 5 minutes. Beyond that, no other thermal transfer printer broke the 10-minute mark.

Of the three fastest, the Tektronix Phaser 200i produces the highest-quality output, followed by the Seiko and the QMS. The Tektronix produces fine transparencies and paper output. The Seiko's paper output is as good as that of the Tektronix. Besides being close in speed (the Seiko's average speeds are only about 2 minutes per file behind those of the very quick Tektronix, and less than 1 minute behind the QMS), these three

Tektronix Phaser II SDX



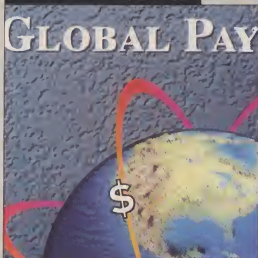
If you want professional-quality color, look no further than the Tektronix Phaser II SDX. It offers rich continuous-tone color and sharper text than other dye-sublimation printers.

For more information, see "The Cold Facts on Color Printers," page 192.

The Best Handouts Money Can Buy

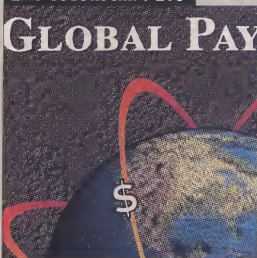
Nearly flawless or merely great: the \$5,000 difference.

TEKTRONIX PHASER II SDX



EXCEPTIONAL IMAGES with sparkling continuous-tone color typify the quality of Tektronix's superb dye-sublimation printer.

QMS COLORSCRIPT 210



GREAT FOR HALF THE PRICE, QMS pushes the thermal wax-transfer technology to print richly saturated colors and crisp text.

models also offer evenly matched features. Both the QMS and the Seiko support PostScript Level 2, and all three printers have HPGL and at least 6MB of RAM.

FEATURES High-quality output demands high-quality features. Memory shouldn't fall below 4MB, printer languages supported should include PostScript Level 2 and HPGL, and the printers should include parallel interfaces. Consider font support, too. Remember that you'll get at least 17 Type 1 fonts with any PostScript printer, and most vendors offer 35 fonts. If you'll need lots of fonts, look for a printer that has a SCSI drive, or at least a SCSI port, so you can download the fonts from your system and store them there.

Most of the higher-end printers come with these options. Standard memory for the dye-sublimation printers was around 16MB, and most of the solid ink and thermal transfer printers ship with about 10MB. All the printers we looked at, except the Canon and the Fargo (both are host-based printers), ship with at least 35 fonts. All the printers except the Canon and the Fargo ship with a version of PostScript and

HPGL. Serial, parallel, and AppleTalk interfaces are available with all of the printers except the ink jet printers and the Fargo Primera.

The Tektronix Phaser 200i, Seiko Colorpoint PSX Model 4, and QMS ColorScript 210 all sport a great selection of features. Each offers wide connectivity with a selection of serial, parallel, AppleTalk, and SCSI ports and at least 39 fonts. Each offers PostScript and the HPGL plotter language, although the Tektronix uses a version of PostScript Level 2, while Seiko's is a cloned version of Level 1 (QMS has cloned versions of both). Level 2 printers give you an advantage because they use the new standard, and they should be faster because they can use data-compression technologies.

All the printers we looked at, except the ink jets, offer a solid amount of memory. If you're going to be producing lots of presentations and you go with an ink jet printer, you might want to spend a little more money to beef up the RAM for the color-intensive images. The HP and the Lexmark ship with 2MB and 4MB, respectively, and are highly expandable.

AFFORDABLE HANDOUTS

TRAINING MATERIALS, quarterly reports, engineering manuals—you have to produce them all. Color helps you get your point across. Not that your results have to be particularly grand—the CFO probably won't swing for anything expensive. You need good color at an affordable price.

INSANELY LOW PRICES If you need color and you need it cheap, no other printer matches the Fargo Primera. This thermal wax-transfer printer carries a bargain-basement price of \$999, the lowest among all printers considered in this review. The Fargo is like the stripped-down version of that car you've been eyeing—it lacks some of the major features you'll find in the contenders. It is a host-based printer (and hence lacks memory), has one resident font, and supports Windows TrueType fonts. At only 203 dots per inch, the resolution is lower than the 300 dpi of its close competitors, the HP and the Lexmark.

The Fargo's print speeds were just behind those of the HP DeskJet, which required 8.5 minutes to output to plain paper; the Fargo took 10 minutes and 45 seconds. And while the Fargo's output is OK, it won't win any awards—the color is splotchy, and backgrounds intended to be a solid color don't appear rich or maintain consistency. But with a price of \$999, how much can you expect? Then again, if you're talking about buying color, you're probably prepared to spend more than \$1,000.

For just \$700 more, you can experience the wonders of the HP DeskJet 1200C—and we think that \$700 is money well spent.

The lower-priced printers aren't as souped up, especially with memory, as the dye-sublimation printers. For more horsepower, you'll have to pay—either by expanding your memory or going with a more feature-rich product. At \$1,699, the HP has 2MB of RAM, 45 typefaces, HPGL, and great output. The Lexmark IBM Color Jetprinter PS 4079, at \$3,199, gives you 4MB of RAM, cloned PostScript, and 35 standard fonts. The printers' RAM is expandable to 26MB and 16MB, respectively. If great output at a low price is your main goal, stick with the HP. No other printer brings as many quality features to general office printing for less than \$1,700.

SPEEDY PERFORMANCE If you pay less than \$4,000 for a color printer, you'll sacrifice a bit of speed. On average, the ink jet printers output to paper more than 2 minutes slower per page than the higher-priced thermal transfer printers do. Among the lower-priced printers, the HP DeskJet was the fastest (and a real bargain). It was a speed demon compared with the baseline Canon printer and it even held its own against some of the higher-priced printers such as the Tektronix Phaser II SDX. The Fargo and Lexmark printers were pretty close—the Fargo was about 2 minutes faster than the Lexmark in printing our PowerPoint file. If speed is a top priority, the best printer to buy is a thermal transfer printer. However, unless you go with the Fargo, you'll pay a premium of about \$3,000 to \$4,000. For that price, you could buy two HP DeskJets and split the printing between them.

The lower-priced printers' speed times were fairly close, except for those of the Canon BJC-800, which was as slow as a snail. It took more than 31 minutes to print our 3-page PowerPoint file to paper, and more than 37 minutes to print it to transparencies. Who wants to wait two hours to print a 20-page presentation? If you need speed, go with the Fargo or the DeskJet. You'll save about \$700 if you opt for the Fargo, but the DeskJet's output quality is worth the money.

The HP and Lexmark printers are fairly equal as far as output times are concerned. They both took about 12.5 minutes to output our PowerPoint file to transparencies, and close to 3.5 to 4.5 minutes for the CorelDraw files. But the

Hewlett-Packard DeskJet 1200C



HP's DeskJet 1200C works with all media types, brilliantly. Colors? Bright and consistent, even across presentation backgrounds. Price? Low enough that you can buy two of them.

For more information, see "The Cold Facts on Color Printers," page 192.

How Low Should You Go?

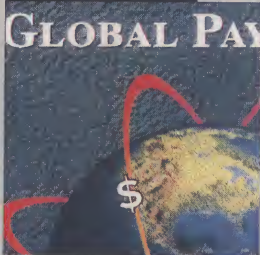
Your choice: Save \$700, and you sacrifice image quality.

HP DESKJET 1200C



GOOD PRICE, GREAT QUALITY mark the Hewlett-Packard DeskJet, which prints clean, easy-to-read text and smooth, consistent colors.

FARGO PRIMERA



SLOTCHY AND WASHED-OUT images produced on the low-resolution Fargo Primera can be hard on the eye.

Lexmark printer sacrifices output quality and costs around twice as much as the HP.

OUTPUT QUALITY If you have a limited budget, your standards for output quality are necessarily lower than they would be if money were no object. The technology that is least expensive—ink jet—just isn't as powerful as dye sublimation and solid ink, and output is fuzzier and spottier. There is an exception to that rule, however. When you need brilliant colors at an affordable price, the solution is clear: Buy Hewlett-Packard's DeskJet 1200C printer.

The DeskJet's output competes with that of printers that are two, four, even five times as expensive. The DeskJet's transparency output was only slightly less vivid and eye-catching than the transparencies produced by several of the dye-sublimation and thermal transfer printers. Its paper output was clean and pleasing on either plain paper or on the glossy stock that HP sells (but go with the glossy paper if you really need results), and it clearly outlasted the washed-out images produced by the two other ink

jets in the tests, the Canon BJC-800 and the Lexmark Jetprinter. With the HP, you don't get what you pay for—you get more.

The Canon and the Lexmark produced images that are not to be sneezed at. Their output is far superior to that of the Fargo thermal transfer printer, which forces you to make a trade-off if you go with its remarkably low price. You can clearly see that solid colors are blends of the major colors (cyan, magenta, yellow), which makes their appearance less smooth and more blotchy. In addition, its resolution is only 203 dpi, compared with 300 dpi in the other affordable printers.

The Canon's colors are very bright, and there are sharp contrasts. However, when you look at big blocks of color—like presentation backgrounds—the output isn't as smooth as the HP's. The Lexmark's output looks a bit washed out in comparison to that from the HP and the Canon, but its colors are much smoother than the Canon's. No matter how you slice it, though, the HP's output really shines, with rich colors and smooth gradients.

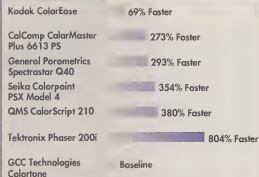
Printing at a Snail's Pace

Face it. Producing color can be the printing equivalent of glacial speed.

Your print speed will vary according to the job. Transparencies tend to take a little longer than plain-paper output because they require extra drying time. And of course the more

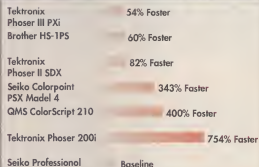
graphics-intensive your files are, the more time you'll have for a coffee break. One way you can improve printing performance is to add more RAM.

Tops at Transparencies



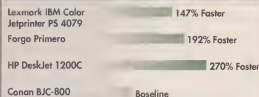
Better

Standouts for Stellar Images



Better

Overachievers Under \$4,000



Better

Of the printers that produced great-looking transparencies in our PowerPoint file test, the **Tektronix Phaser 200i** was the speed demon. The Kodak ColorEase produces stellar output, but it's not ideal if speed is your top priority. The other printers were in the same speed league—you'll see more significant differences with output quality and price.

Among the printers that output the highest quality PowerPoint image on paper, the **Tektronix Phaser 200i** topped the printing speed charts. The QMS ColorScript 210, which costs \$1,000 less than the Phaser 200i, was a distant second. Like the Kodak ColorEase, the Seiko Colorpoint PSH produces great output, but it takes its own sweet time.

Of the printers whose price tags don't run above \$4,000, the **HP DeskJet 1200C** was the quickest, but the Forgo and the Lexmark gave it a challenge. The Canon BJC-800, a host-based printer like the Forgo, was especially sluggish in this plain-paper PowerPoint test.

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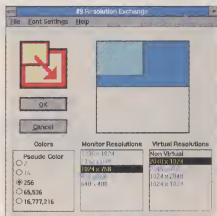
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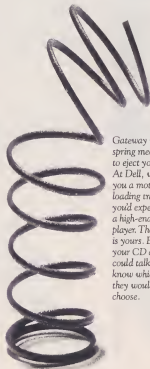


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Laser In on Color Printers

QMS's ColorScript 1000: plain-paper versatility at black-and-white speeds.

Compromise. That's what color business printing is today. No one printer gives you everything your business needs—deep, rich color on inexpensive paper for full-page presentations, high resolution for projecting transparencies, and the ability to print block-and-white text pages as fast as a loser printer. For now that's just a pipe dream—unless you're prepared to pay \$30,000 or more for the versatility, speed, and plain-paper convenience of a color loser. Starting this fall, however, affordable desktop color loser will make its debut when QMS ships the ColorScript Loser 1000 with a \$12,499 price tag.

What's so great about color loser printers? First of all, the print technology is familiar. It's the same as that in your current printer and office copier. Both involve melting dry toner to paper—so business users already know exactly how to replace toner cartridges. And color loser printers will output business-quality color on plain paper.

Besides that, color loser printers don't sacrifice speed. The QMS ColorScript Loser, for example, prints block-and-white text of 8 pages per minute, the same roted speed as the Hewlett-Packard LaserJet 4, and prints full-color pages of 2 pages per minute, as fast as Tektronix's Phaser 200i thermal wax-transfer printer.

In addition to these advantages, a color loser printer can be dual-purpose. You don't need to print to your graphic department's thermal transfer or solid ink printer on those occasions when you need color.

A color loser can sit at the end of your network and produce block-and-white pages all day long—and give you slices of color when you need it.

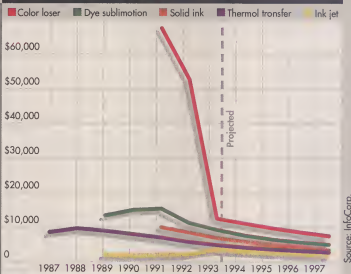
But the main advantage that color loser offers over other printing technologies is versatility. Want to add a color bar chart to a 10-page

business report, print a half dozen overheads with full-color handouts for a presentation, or add a color logo to a business letter? Color loser can do it all.

Does the release of QMS's color loser printer make 1993 the year of color losers? We don't think so. While the \$12,499 price cuts the cost of a color loser printer in half, it still exceeds the \$10,000 price cap that many of us have set for capital expenditures. And then there's the problem of distribution—most of our offices still don't have color copiers to duplicate the high-volume color jobs we need.

We predict that the year of the color loser printer will be 1995, by which time Hewlett-Packard is expected to release a color loser model. Market projections show that by

1995: The Year of the Color Lazer?



In a year and a half, color lasers are expected to fall below the \$10,000 capital expenditure threshold, making versatile color attractive for nearly any office.

that time prices will have dropped to somewhere between \$5,000 and \$10,000, and color loser technology will be reliable enough for mainstream business users. In the meantime, QMS has stoked out the leading edge.

—Cyndy Botes

The Cold Facts on Color Printers

You want choices? You have choices—from print technology to speed to price.

| | GCC Technologies Calatone | Kodak CalatEase | Seika Professional Calatpoint PSH | Tektronix Phaser II SDX | CalCamp CalatMaster Plus 6613 PS | Fargo Prismo |
|----------------------------|--|--|--|---|--|---|
| Phone | (800) 422-7777 | (800) 344-0006 | (800) 888-0817 | (800) 835-6100 | (800) 932-1212 | (800) 258-2974 |
| Reader service no. | 672 | 673 | 674 | 675 | 676 | 677 |
| FEATURES | | | | | | |
| Printer type | Dye sublimation | Dye sublimation | Dye sublimation | Dye sublimation | Thermol transfer | Thermol transfer |
| Price | \$8,999 | \$7,999 | \$9,999 | \$9,995 | \$6,995 | \$995 |
| Processor | RISC | SPARC-RISC | RISC | RISC | RISC | Host based |
| Memory (standard/maximum) | 16MB/64MB | 16MB/86MB | 16MB/64MB | 16MB/64MB | 10MB/34MB | None (32KB buffer) |
| Resolution | 300 dpi | 300 dpi | 300 dpi | 300 dpi | 300 dpi | 203 dpi |
| Number of fonts | 39 | 35 | 39 | 39 | 39 | 1 |
| Languages supported | Cloned PostScript Level 2, HPGL 1 | PostScript Level 2, HPGL 2 | Cloned PostScript Level 1 | PostScript Level 2, HPGL 1 | Cloned PostScript Level 1, Roster | TrueType |
| Interfaces supported* | S, P, A, SCSI | S, P, A, SCSI | S, P, A, SCSI | S, P, A, SCSI | S, P, A, SCSI | P |
| COLOR FEATURES | | | | | | |
| Number of colors | 16.7 million | 16.7 million | 16.7 million | 16.7 million | 16.4 million | 262,000 |
| Color-matching system | Pantone | Kodak | Kodak | TekColor Pantone | Kodak, EFI, Pantone, Agfa | None |
| PERFORMANCE | | | | | | |
| | (Time to print a 3-page file in minutes:seconds) | | | | | |
| PowerPoint to paper | 13:15 | 11:39 | 19:30 | 10:44 | 5:35 | 10:45 |
| PowerPoint to transparency | 20:21 | 12:03 | 19:36 | 22:59 | 5:27 | 10:49 |
| SUMMARY | | | | | | |
| Pros | Very good quality output. | High-quality transparencies; great continuous-tone output. | Good output. | Output almost as brilliant as the Kodak CalatEase's. | Produces rich, bright colors on transparencies; fast printing. | Incredible bargain price. |
| Cons | Expensive; slow output. | Expensive technology. | Noisy, expensive. | Expensive. | Control panel missing basic functions. | Low-resolution output; very few features. |
| Verdict | Solid printer; consistently high output quality. | The top choice for printing transparencies. | A good color printer with no outstanding features. | Best quality and speed for paper output among dye-sub printers. | Excellent choice for transparency printing. | If you're bosing your choice, this is your printer. |
| | | Best Transparencies | | Best High-Quality Handouts | | |

* S=Serial, P=Parallel, A=AppleTalk.

| QMS ColorScript 210 | Seiko Colorpoint PSX Model 4 | General Parametrics Spectrastar Q40 | Tektronix Phaser 200i | Canon BJC-800 | HP DeskJet 1200C | Lexmark IBM Color Jetprinter PS 4079 | Brother HS-1PS | Tektronix Phaser III PXi |
|---|--|--|---|--|--|--|---|---|
| (800) 523-2696 | (800) 888-0817 | (800) 223-0999 | (800) 835-6100 | (800) 848-4123 | (800) 752-0900 | (800) 358-5835 | (800) 284-4357 | (800) 835-6100 |
| 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 |
| Thermal transfer | Thermal transfer | Thermal transfer | Thermal transfer | Ink jet | Ink jet | Ink jet | Solid ink | Solid ink |
| \$4,995 | \$5,999 | \$6,799 | \$5,995 | \$1,999 | \$1,699 | \$3,199 | \$9,995 | \$9,995 |
| RISC | RISC | RISC | RISC | Custom chip | RISC | RISC | TI 34010 | RISC |
| 8MB/32MB | 10MB/34MB | 10MB/10MB | 6MB/14MB | None (7KB buffer) | 2MB/26MB | 4MB/16MB | 10MB/26MB | 10MB/22MB |
| 300 dpi | 300 dpi | 300 dpi | 300 dpi | 360 dpi | 300 dpi | 360 dpi | 300 dpi | 300 dpi |
| 65 | 39 | 52 | 39 | 3 | 45 | 35 | 38 | 39 |
| Cloned Post-Script Levels 1 and 2, HPGL 1 | Cloned Post-Script Level 1, HPGL 1 | PostScript Level 2, HPGL 1 | PostScript Level 2, HPGL 1 | HPGL 1, Canon BJ mode | PostScript Level 2, HPGL 2 | Cloned Post-Script Level 1, HPGL 1 | Cloned Post-Script Level 1, HPGL 1 | PostScript Level 2, HPGL 1 |
| S, P, A, SCSI | S, P, A, SCSI | S, P, A | S, P, A, SCSI | P | P | P, A | S, P, A, SCSI | S, P, A, SCSI |
| 16 million | 16.7 million | 16.7 million | 16.7 million | 16.7 million | 16.7 million | 16.7 million | 16.7 million | 16.7 million |
| Pantone | Kodak | Pantone | TekColor, Pantone | Canon | Pantone | Pantone | None | TekColor, Pantone |
| 3:54 | 4:24 | 5:09 | 2:17 | 31:26 | 8:29 | 12:43 | 12:11 | 12:41 |
| 4:14 | 4:29 | 5:10 | 2:15 | 37:31 | 12:33 | 12:51 | 14:30 | 12:41 |
| Fast; great paper and transparency output. | Excellent paper output; fast printing. | Solid performance and output; quiet. | Excellent paper output; speediest printer tested. | Decent ink jet quality; low price. | Superb print quality on all media types. | 360-dpi resolution, AppleTalk interface. | Produces rich color on plain-paper stock. | Great plain-paper color; handles many paper stocks. |
| Difficult to correctly align paper in tray. | Difficult to set up for printing transparencies. | Documentation weak; hard to install drivers. | Less standard RAM than competitors. | Very slow printing. | Standard 2MB of RAM could be limiting. | Middling output quality; slow. | Poor transparency output. | High price. |
| Delivers high-quality documents at a low price. | A fine choice for producing high-quality handouts. | A solid thermal transfer printer with no special attributes. | A top choice for producing high-quality handouts. | You'll need the patience of a saint to use this printer. | Excellent price and output quality. | No features to rival the HP DeskJet 1200C. | Among the slowest and priciest we tested. | Excellent for producing high-quality handouts. |

Best
Affordable
Handouts

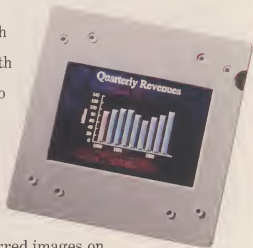
Project your MESSAGE

Talking to a roomful of people? Your ideas will shine with LCD projection panels.

BY ROBERT LINDSTROM

It's everyone's nightmare. You're making a pitch that's critical to your career. You're sopping with sweat. Your stomach is slowly twisting into a half hitch. And you have a lump in your throat the size of a Buick Roadmaster.

Face it, you're trapped in the presentation from hell. You and your audience hunch around your laptop, pathetically trying to follow the blurred images on the screen. And the sale? It was lost the moment everyone had to crane their necks to view that dinky display. If only you had brought an LCD projection panel.



Active-Matrix LCD Panels

| | |
|----------------------------|----------------------|
| 3M Model 5900 | Polaroid DP 2000 |
| Apollo Vision 262K | Praximo Ovation 820 |
| Chisalm TFT Rainbow 700 HD | Praximo Ovation 822C |
| InFocus PanelBak 550 | Sharp QA-1150 |
| nView ViewFrame Spectra C | Sharp QA-1650 |
| nView Media Pro | Telex M2X |

Any time you have to do a presentation outside the familiar confines of your office, you're faced with a real dilemma. You could drag along your entire desktop system on a little cart, but it's a real hassle, and it works best if you're built like Sylvester Stallone. And even a big monitor looks like a Nintendo Game Boy when you're



viewing from a seat in the back row of a large room.

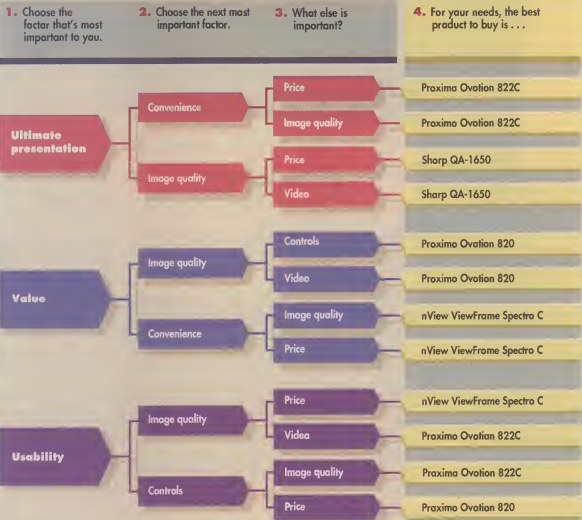
The best solution is to use the new generation of color LCD projection panels. You can just plunk the panel onto an overhead projector, plug it into your laptop, then flick off the lights and voilà—you have a room full of transfixed spectators. Previously ordinary

images suddenly become big, bold, and dramatic.

To help you find the best panel for your needs, we looked at 12 active-matrix LCDs for three scenarios: which are best at handling blow-out-the-budget presentations, which deliver the most on a shoestring budget, and which are the hands-down easiest to use.

PC/COMPUTING DECISION MAKER

Buy the active-matrix LCD panel that's best for your business.



LCD PROJECTION PANEL

Proxima's Ovation 822C panel powerhouse.

Throw away your giant monitors; Proxima's pricey flagship 822C is a super standout in image quality. It gets high marks for convenience, with software menus you can run from a remote or on-panel switches.

Proxima Ovation 822C • Proxima Corp. • 6610 Nancy Ridge Dr., San Diego, CA 92121 • (800) 447-7694, (619) 457-5500 • \$6,995

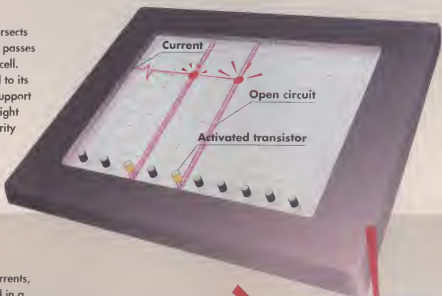


How It Works: Active vs. Passive Matrix

If you want sharp, luminous colors, you want an active-matrix LCD.

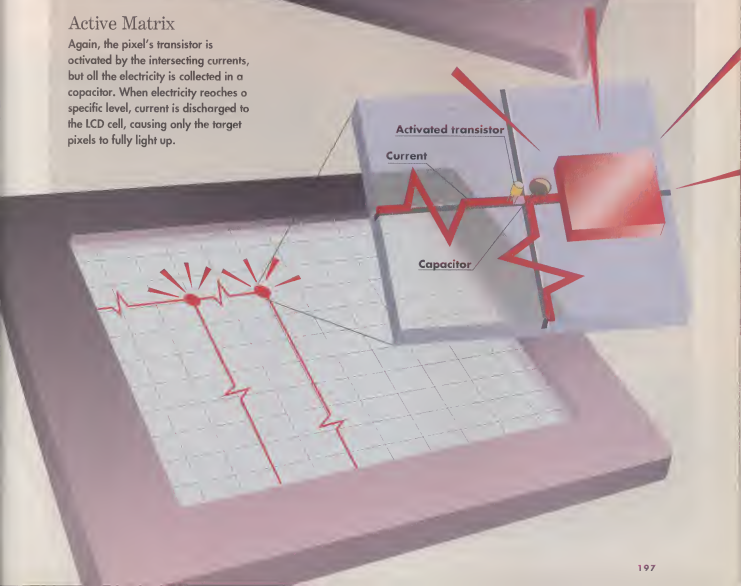
Passive Matrix

When a horizontal current intersects on an open vertical trace, voltage passes through and lights up the LCD cell. Because the voltage must build to its full potential, the panel can't support the precise timing required to light only the target cells. Image clarity suffers as a result.



Active Matrix

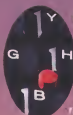
Again, the pixel's transistor is activated by the intersecting currents, but all the electricity is collected in a capacitor. When electricity reaches a specific level, current is discharged to the LCD cell, causing only the target pixels to fully light up.





We designed it for deep thinkers without

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PCMCIA Cards



deep pockets.

ThinkPad 350

What's inside

| | |
|--------------------------------------|--|
| Processor: 486SL 25 MHz | Faster than a shrinking budget. |
| Display: 9.5" monochrome | Big picture without big bucks. |
| Weight: 5.2 lbs. (with battery pack) | Light on your wallet, light on you. |
| Battery Life: 2.6 to 9.3 hours† | Get ready for the longest power trip of your life. |
| PCMCIA: Type II (2.01) slot | Adapts the size of a credit card. |
| Hard Drive: 125MB or 250MB | Store all of your deepest thoughts. |
| Price: \$1,999.00 for 125MB†† | Who says power has its price? |

Human by design.



Color and monochrome displays available.

IBM®

THE ULTIMATE

YOUR MULTIMEDIA presentation has been polished to a shine. Sitting in front of you is a full house of big shots with fat wallets and skinny attention spans. You have to hook 'em fast and keep 'em pinned to the edge of their seats. Fire up the projector, dim the lights, and make that expensive LCD screen earn its keep.

MAXIMUM DISPLAY SIZE For take-no-prisoners presentations, superb image quality is a must. Anything less gets in the way. You'll want the maximum image size possible. Active-matrix LCDs generally come in two varieties: 8.4-inch or 8.5-inch and 10.4-inch or 10.5-inch diagonal displays. (The InFocus Panel-Book 550 sports a midsize 9.4-inch screen.) The two extra inches on the big panels yield more than a quarter more screen area, and deliver sharper, brighter images because more light can pass through the larger glass. Of the 12 panels we tested, half offer large displays. That's some help, but you can't choose an LCD panel based on display size alone.

COLOR SATURATION You know it when you see it. When it's right, words pop, pictures seem bright and lifelike, and images leap off the screen. Too much color saturation and contrast gives you a muddy mess. Too little, and the animated face on the screen turns into something from a Boris Karloff movie. The right balance gives you true colors and subtle detail.

Unfortunately, when it comes to color, the naked eye doesn't always report the naked truth. We tested the

panels using a Minolta LCD Color Analyzer to measure the default color settings of the panels while displaying a complex bitmap, and compared them to the standard of display excellence—the NEC 4FG monitor.

The Polaroid and the Chisolm—two 10.4-inch panels that produced only average image quality—offered the highest color saturation. The Polaroid's default settings are dark and highly saturated, as are those of the higher-end Proxima. The high-end Sharp produced middling color saturation while delivering good image defaults. The nView Spectra C and lower-end Proxima model—panels with smaller glass that display good image quality—rated at the bottom of the pack. Our test results show that color saturation is just one factor that you need to consider when selecting an LCD panel.

LARGE COLOR PALETTE As with color saturation, the numbers don't always tell the whole story. Too stingy a palette can leave you with a splotchy psychedelic mess that would look best on a tie-dyed T-shirt. More colors generally translate into more accurate representations, particularly in images with gradient fills or flesh tones, but the industry has no standard way to verify manufacturers' claims. When it comes to complex images, a panel with 16 million colors will annihilate one with a hundredth as many. But if it's a choice between a panel that supports 185,000 colors and one that handles 200,000, base your decision on what you see rather than on raw specs.

Most panels offer a choice of at least three different palettes, allowing you to achieve more detail by using a larger palette. For text-only presentations, a simple palette with 8 or 64 colors is generally adequate, but even basic graphics demand thousands or even tens of thousands of colors.

The panels we tested had a range from a maximum of 185,000 colors all the way up to 16.7 million. The nView ViewFrame Spectra C, which offers the smallest palette, produced above-average image quality, while the Polaroid, with 16.7 million colors, had only average image quality. On the other hand, the high-end Sharp, also sporting 16.7 million colors, offers excellent image quality. The moral? Because the color palette is just one consideration, decide what's most important to you and then use our decision maker to zero in on the product with the best combination of features.

LUMINANCE What good are a sharp screen and all those colors if you have to squint to see the image? You can't

Sharp QA-1650



Sharp's outstanding graphics and video image quality will make your presentation shine. And its large, lighted remote makes adjustments a snap from anywhere in the room.

For more information see "Panel Profiles," page 208.

always count on doing presentations in a place so dark it has bats hanging from the ceiling. A critical factor in overall LCD image quality is brightness. You want a display that provides adequate luminance, allowing as much light to pass through from the projector as possible.

We tested the luminance of all panels against our standard NEC 4FG. And again, the panels that produced the brightest images didn't necessarily have the best image quality. The Chislm panel offers a bright, stable picture, but it lacks the smooth colors of the Sharp and Proxima systems. You'll definitely see rough edges on the Chislm; and despite the large color palette, the flesh tones and gradients appear banded and blotchy. As with color saturation, the Polaroid has high luminance, but overall image quality is only average. The high-end Sharp and Proxima panels produce the best overall image quality but yield run-of-the-mill luminance.

Obviously the brightness of the overhead projector is important as well. Even the best screen will appear drab when it's backed up with a wimpy projector or a bulb that's on its last legs. The average incandescent overhead projector produces around 3,000 lumens—for the best results you shouldn't use anything less powerful than an LCD panel.

BUILT-IN VIDEO SUPPORT If you're not using video yet, trust us: You will be soon. Built-in video support is a must. It's an option (add-in card or external box) for most panels, but comes standard in only half the panels we tested. The 3M, the nView Media Pro, and both Proxima and Sharp models don't charge extra for video. The support they offer varies from including a single video input for NTSC or PAL to allowing multiple sources, including SECAM and S-Video standards. The nView Media Pro, which supports all four standards and allows for the connection of four sources, is the panel to choose if hooking up video is all that

How Do You Judge Image Quality?

Beauty truly is in the eye of the beholder



Using the NEC 4FG monitor as a baseline for our tests, we found that high color saturation and luminance ratings alone bear little relation to an LCD panel's image quality.

matters. The 3M and high-end Proxima allow three sources and support all four video standards. The high-end Sharp can handle each kind of video but only supports two sources at once. Lower-end models with video, like the Sharp and Proxima, support only NTSC and PAL. On the low-end Proxima you can have only one source at a time, while the Sharp allows two.

The Sharp QA-1650 took top honors for video images in our tests by a whisker. Its bright, clear picture shows smooth skin tones and looks good even when projected as a ten-foot-high image. Proxima's 822C also offers strong video performance. The nView Media Pro likewise produces dazzlingly sharp graphics and an excellent, stable video image, but it falls short in providing easy access to its contrast and video tuning controls.

BEST VALUE

WITH UNENDING PRICES wars tearing up the PC landscape, it may seem strange to call a \$5,000 product cheap. You may be feeling the hot breath of your company's bean counter on your neck, but if you're investing big bucks in a product that has to pay back with big impact, less isn't always more.

LOWEST PRICE If an extra zero shows up at the end of your annual hardware budget, you can haul in one of the big-dollar displays. The rest of us, in this increasingly penny-pinching era, will go for one of the more affordable LCD panels priced between \$5,000 and \$6,000. If you absolutely have to have an active-matrix panel at the absolute lowest price, consider the \$4,795 Apollo Vision 262K. It comes with a slim, soft case, a bare-bones manual, and not much else. For a few hundred dollars more, the \$5,195 Telex M2X offers adequate performance, video, a remote control, and a carrying case, but it sports awkward controls. Yes, these panels are cheap, but you'd do better to dig a bit deeper and spend \$500 more for the far better Sharp QA-1150. It offers a more stable image, plus video support, a remote control, and greater usability.

The real price-performance leaders were a bit more expensive. At \$5,595, the nView Spectra C is a standout for good image quality and ease of use, but it lacks video. At \$5,695, the Proxima Ovation 820 provides comparable image quality and includes

video. Finally there's the \$5,995 InFocus PanelBook 550, which provides strong performance in a small package for a high price.

HIGH IMAGE QUALITY Who wants a projection panel at any price if its output looks more like a kid's game on a CGA monitor than a slick sales pitch? For best results, opt for one that yields crisp images, rich colors, good contrast, and superior luminance.

Because of the smaller display size of the lower-priced panels, you can't expect to get the same superb image quality as the high-end Sharp, Proxima, and nView panels provide. The lower-priced siblings do offer respectable image quality, however. Of these three contenders, the nView and Proxima offer the best quality, with the nView coming out slightly ahead. Although the Sharp brings up the rear, it also provides a good image.

MUST-HAVE FEATURES You may think a superbright LCD with good image quality is all you need. But thoughtful features make LCDs far easier to use, and make you more productive. Can you live without video for the sake of great panel controls? Or would you rather do without a remote in favor of a carrying case? Video support, on-panel and remote controls, a carrying case, and image-control options are recommended extras. Other goodies like Y-cables, video cables, and bundled software sweeten the deal.

The panel with the longest list of important extras among those with smaller displays is the Proxima Ovation 820, which includes video support, on-panel and remote controls, and image-control options including freeze, forward, reverse, pause, clear, and reverse image. But even the Proxima doesn't have it all—it lacks a carrying case. While a carrying case may not matter if you plan to use the panel in your office only, it's crucial if you'll be on the road. A case for the Proxima will set you back an additional \$200 to \$300, depending upon your choice of hard or soft casing. Of the six panels we tested with smaller displays, three include carrying cases: Apollo, nView ViewFrame Spectra C, and Telex M2X. The InFocus PanelBook comes with a protective sleeve that doesn't offer the same protection as a padded carrying case but wards off in-house dings.

The nView comes with a much shorter list of extras: remote, carrying case, and control options such as focus and reset. The lower-priced Sharp includes video support, remote, and remote control

Proxima Ovation 820



With its onscreen menu and feature-packed remote, the lower-end Proxima is our pick for value-conscious presenters. Like its big brother—our overall LCD winner—it has solid image quality and is easy to use.

For more information, see "Panel Profiles," page 208.

Our Best Value vs. The Ultimate LCD Panel

You decide: is it worth the money?

Our best value pick, the Proxima Ovation 820, has a lot going for it, including audio support and a high usability rating. But how does it compare to the

ultimate panel, the Sharp QA-1650? For an extra \$1,100 the Sharp adds a lighted remote, a bigger display, and more video options and colors.

| | Best Value—Proxima 820 | Ultimate—Sharp QA-1650 |
|--------------------|---------------------------|----------------------------|
| Price | \$5,695 | \$6,795 |
| Screen size | 8.4-inch diagonal display | 10.4-inch diagonal display |
| Color palette | 2 million colors | 16.7 million colors |
| Control options | On-panel, remote, menu | On-panel, remote, menu |
| Programmability | Display adjustments | Display adjustments |
| Remote | Wireless | Lighted, wireless |
| Serial port | Yes | Yes |
| Video support | Single source | Multiple sources |
| Audio support | Audio I/O, volume control | None |
| Added cost of case | \$300 | \$110 |
| Usability score | 92.3 | 93.3 |

menu options such as Blank Screen and Enlarge Image. In addition to the protective sleeve, the PanelBook provides video support, remote, and a menu-based interface with a multiple-language option, programmable keys, and freeze.

If portability is a top concern, the svelte, 5.5-pound PanelBook is a good choice. The compact design features a slide-away drawer that houses the remote control for safe keeping. It's not as light as the 4.8-pound Polaroid—weighing in at only three pounds less than the heaviest panel, the Media Pro—but it's small enough to slip into a briefcase. If you opt for a hard carrying case for your LCD, expect to add as much as 10 or 15 pounds. Another roadworthy panel is the easy-to-use ViewFrame Spectra C, which comes with a rugged carrying case.

USABILITY ISSUES When it comes to the initial setup procedures, all LCD panels are created equal. You plug one end of the clearly labeled cables into the computer and the other into the LCD. But optimizing operation isn't always so intuitive. With color, sharp-

ness, contrast, and even more complex variations, fine-tuning these panels isn't always easy.

Adjusting image quality on an LCD is done differently on each panel we tested, and just about all of them require some guesswork about what each of the controls does. Some of the lower-priced panels we tested offer remote control only, not both. The nView Spectra C and the InFocus PanelBook use a remote to operate an onscreen menu, while the Proxima, Sharp, Apollo, and Telex provide both on-panel and remote controls for operating the LCD.

Some panels boast controls that are dramatically simpler to use than others. For example, to adjust the image contrast on the Proxima, you use the remote control or the on-panel controls to operate the panel's software. In either case you have to press the Shift key, then use arrow keys to select the Contrast option, and then actually adjust the image. The nView offers a simpler approach—simply select a button labeled Color on the remote and press it until the image adjusts to the desired contrast.





SONY

Vertically Flat.

Look at the screen on a Sony Trinitron® monitor. See how little glare there is? How sharp the details are? That's because the screen is flat from top to bottom. Screens on ordinary monitors aren't, not even the "flat/square" ones. And the difference shows.

Sony Trinitron monitors also have a Super Fine Pitch™ Aperture Grille for crisp text and bright images. Multiscan® technology for compatibility with most major graphics standards. And they're available in 14", 17" or 20" sizes.

So never settle for anything less than a Trinitron monitor from Sony. The ones with flat screens from top to bottom. For better images from edge to edge.

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Circle 129 on reader service card.

BEST USABILITY

THE SLIDES ARE CLICKING
by with military precision and
the crowd is buying every word.
Then from out of the inky blackness
at the back of the room comes a
complaint that the screen is too dark.
No problem. Tap the remote button to
call up the brightness control, then
with a single tap you're back in stride.

EASY ON-PANEL CONTROL With most presentations, complexity can lead to calamity. The truth is, you want a display that works as easily as the one-button projector it sits on.

There are three types of LCD panel controls: on-panel, remote, and screen interface. A panel can have one type or a combination of the three. On-panel is the most basic method and is used on 9 of the 12 panels we tested. The nView panels have a pocket that holds the remote for operation from the panel, but do not offer redundant controls. While this simplifies operation, it offers no backup if the remote is lost or damaged.

In one LCD after another we found that the on-panel controls were either absurdly plentiful and small, or so few that they required a tedious series of shifts and clicks to perform a desired function. The Polaroid DP 2000 sports the worst on-panel controls—the front-edge buttons and dials are limited in function, hard to find, and difficult to use. Apollo's Vision 262K also has a control set with unresponsive buttons and a pair of tint and fine-tune knobs that you can barely grasp. The Telex and

Chisolm panels sport identical buttons that are awkwardly located on the panel's corner.

The 3M panel has large, enticing buttons that seem easy to operate at first look, but our usability testers found them spongy and unresponsive. Proxima's on-panel controls could be larger, but they're squarely situated in the center of the panel.

HANDY REMOTE CONTROL It's hard enough to run an ordinary presentation; toss in a pitch-black room, a slippery remote control bristling with indistinguishable buttons, and a pair of sweaty palms, and you might as well just flick on the lights and wish everyone goodnight.

Complete control over your presentation requires a remote that lets you command the LCD from anywhere in the room—without fumbling for the right buttons. Of the 12 panels we tested, 9 come with remotes. Surprisingly, the \$9,000 3M doesn't. The panels from Chisolm and Polaroid offer optional remotes.

The buttons on the Proxima's palm-size remotes are tightly spaced and identically sized, making it too easy to press the wrong key and impossible to feel for the right one. Both nView models we tested are controlled solely from the remote. Our testers found the design for the Spectra C remote easier to use than the more expensive Media Pro because of a simpler layout.

The high-end Sharp wins big points for having the only lighted remote. Just as important, it uses the same selection scheme as its on-panel controls. The lower-priced Sharp has a confusing backlit LCD readout on its control and it's the only feedback you have because the Sharp lacks an onscreen menu.

INTUITIVE SCREEN INTERFACE Without visual feedback, adjusting output is like flying a plane with your eyes closed. The best-designed LCD panels all provide onscreen status displays that are controlled from the panel's dedicated buttons or redundant keys on the remote. Unfortunately, most of these force you to move a cursor through a series of steps until you land on the desired setting. Then, and only then, can you use a common control button to make the adjustment.

On the high-end Sharp, for example, a menu button on the panel activates the status display, a select button steps you through to the setting you want, and up and down keys control the level of that setting. This process can be frustrating if you have to move between settings—say, color, tint, and contrast—to get the look you're

nView ViewFrame Spectra C



An intuitive remote control plus strong graphics performance and the top usability score make the Spectra C the best choice for those who want a panel that's extremely easy to operate.

For more information, see "Panel Profiles," page 208.

Smooth Operators

Panel controls that don't get in your way.

LCD panels may look a bit like Etch-A-Sketches, but their operation is far more difficult. On-panel controls, remote controls, and screen menus let you adjust image quality and positioning, as well as

perform special effects. But how easy is it to get to all of these features? To determine which panel was the easiest to use, we put them to the test of *PC/Computing's* Usability Lab.



Proximo's redundant controls mean that if the remote is out of commission, the show will go on.



3M's large buttons look easy to use, but their spongy feel makes selecting options take a while.



The Telex (shown) and Chisolm control keys are located awkwardly on the front corner of the panel.



Sharp's oversized, lighted remote never leaves you guessing about which button to press.

after. Sharp further complicates things by putting the onscreen status box in the center of the image.

The Proxima panels also offer this selection scheme but allow direct access to options with dedicated function keys. The onscreen interface is straightforward and easy to grasp. A status window gives access to contrast, tint, synchronization, intensity, source, color palette, volume, and serial port control. Each adjustment has a level indicator so you can see your settings.

The nView interface is simple to use but would be

even better if it didn't make you move the cursor to a separate setting—not only for functions, but for the up and down settings for tint, contrast, and color. Our usability testers weren't hindered by this scheme and, in fact, rated the Spectra C as the most convenient to use. The high usability rating is undoubtedly a result of the nView's simplicity: Without on-panel controls there's only one set of commands to master. The InFocus PanelBook also offers a single set of controls, but our testers found it more difficult to use.

Panel Profiles

Colors, controls, convenience—you want it all.

| | 3M Model 5900 | Apollo Vision 262K | Chiselm TFT Rainbow 700 HD | InFocus PanelBook 550 | nView ViewFrame Spectra C |
|------------------------|--|---|---|--|---|
| Phone | (800) 328-1371 | (800) 777-3750 | (800) 888-4210 | (800) 327-7231 | (800) 736-8439 |
| Reader service no. | 687 | 688 | 689 | 690 | 691 |
| FEATURES | | | | | |
| Price | \$8,995 | \$4,795 | \$5,295 | \$5,995 | \$5,595 |
| Display size | 10.4 inches | 8.5 inches | 10.4 inches | 9.4 inches | 8.4 inches |
| Panel size | 13.75 by 13.75 by 2 inches | 14.2 by 12.8 by 1.6 inches | 15.4 by 12.5 by 2.1 inches | 9.5 by 11.25 by 2 inches | 14.8 by 12.7 by 2.2 inches |
| Weight | 5.69 pounds | 5 pounds | 6.8 pounds | 5.5 pounds | 6.7 pounds |
| Serial port | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Audio support | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Carrying case | <input checked="" type="radio"/> | <input checked="" type="radio"/> | Optional | Optional | <input checked="" type="radio"/> |
| VIDEO CONTROLS | | | | | |
| On-panel | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Remote control | <input type="radio"/> | <input checked="" type="radio"/> | Optional | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Software interface | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| VIDEO SUPPORTED | | | | | |
| NTSC | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | Optional |
| PAL | <input checked="" type="radio"/> | Optional | Optional | <input checked="" type="radio"/> | Optional |
| SECAM | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| SUMMARY | | | | | |
| Usability Score | 87.5 | 90.4 | 74.0 | 79.8 | 96.2 |
| Pros | Great onscreen menu; large controls are easily accessible but hard to use. | Least expensive of the bunch. | Bright, sharp images; sturdy metal case; good price for a large display. | Portable; compact; lightweight; good brightness and color. | Strang casing; simple to use; solid performance; good price. |
| Cons | Expensive; no remote. | No software menus; weak documentation; unsatisfactory images. | No built-in video; remote not included; chicklet-size panel controls are placed inconveniently. | No software interface or redundant controls; same color banding. | Lacks redundant controls; no built-in video. |
| Verdict | Has a lot going for it; would be very competitive at a lower price. | Not a great buy, even at the low price. | A good image for the price; needs a remote and software interface. | Perfect for the frequent traveler. | Its simplicity makes it an excellent buy if you can't need video. |

● YES ○ NO

Best Usability

| nView Media Pra | Palaraid DP 2000 | Praxima Ovation 820 | Praxima Ovation 822C | Sharp QA-1150 | Sharp QA-1650 | Telex M2X |
|--|--|--|--|--|---|--|
| (800) 736-8439 | (800) 225-1618 | (800) 447-7694 | (800) 447-7694 | (800) 529-8662 | (800) 529-8662 | (800) 328-3771 |
| 692 | 693 | 694 | 695 | 696 | 697 | 698 |
| \$8,595 | \$5,995 | \$5,695 | \$6,995 | \$5,295 | \$6,795 | \$5,195 |
| 10.4 inches | 10.4 inches | 8.4 inches | 10.4 inches | 8.4 inches | 10.4 inches | 8.5 inches |
| 15.8 by 12.7 by 2.6 inches | 12.2 by 12.2 by 1.7 inches | 13.25 by 13.5 by 1.4 inches | 13.25 by 13.5 by 1.4 inches | 14.2 by 12.2 by 2 inches | 15 by 12.5 by 2 inches | 14 by 12 by 2.25 inches |
| 8.75 pounds | 4.8 pounds | 5 pounds | 5 pounds | 6.7 pounds | 6.7 pounds | 5.8 pounds |
| ○ | ○ | ● | ● | ● | ● | ○ |
| ○ | ● | ● | ● | Optional | Optional | ● |
| ● | ● | ○ | ○ | Optional | Optional | ● |
| ● | ● | ● | ● | ● | ● | ● |
| ● | Optional | ● | ● | ● | ● | ● |
| ● | ○ | ● | ● | ○ | ○ | ● |
| ● | Optional | ● | ● | ● | ● | ● |
| ● | ● | ● | ● | ● | ● | ● |
| ● | ● | ● | ● | ○ | ● | ○ |
| 89.4 | 57.7 | 92.3 | 94.2 | 87.5 | 93.3 | 90.4 |
| Sharp, stable image; industrial strength; multiple-video inputs. | Bright image; lightweight; extrolong cables. | Slim, light; easy to use; good color and controls; remote and video support | Bright, sharp image; slim, light design; remote and video support included. | Good, stable image, color, and video support for the price. | Top video images; lighted remote buttons; good color. | Good color and contrast; strong case, remote, and video for low price. |
| Unfriendly menu and remote control. | Moderate image quality; weak on-panel controls and documentation. | Weak documentation; small buttons on panel. | Small on-panel buttons with cumbersome menu selection. | No software interface; unfriendly remote. | Bulky design; lacks software interface. | Awkward controls. |
| Solid performer, but pricey; good buy if you need to switch between video sources. | Does not perform as well as other 10.4-inch models; adding video costs too much. | Very good image, video support, and intuitive feature set make this a great buy. | Very good video and graphics quality; a top-of-the-line panel that is easy to use. | A good value for limited budgets if you don't mind the puzzling remote design. | As good as you can get for video and graphics. | A decent performer, but nothing special. |

Best Value

Ultimate Presentation

The perfect laser for today.



THE EPSON ACTIONLASER 1500

The Epson ActionLaser 1500 is a terrific laser printer, right out of the box, right now. But should your printing requirements change, the ActionLaser 1500, unlike some others, has the ability to expand with you.

The perfect laser for tomorrow.

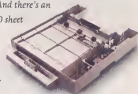


Epson's RITech (Resolution Improvement Technology) increases the ActionLaser's normal 300 dpi print quality to eliminate jagged edges right where you need it: in the curved lines of letters, numbers and images. And Epson's MicroArt Printing technology gives you blacker blacks and finer lines.



27 fonts (13 scalable) are standard. Should you expand your typographical horizons, unlimited fonts are easy to install via HP-compatible plug-in cartridges, available anywhere.

The ActionLaser has 150 sheet paper capacity (letter or legal), and handles stacks of labels, envelopes and overheads with ease. And there's an optional 250 sheet auto-feed cassette, for a total of 400 sheets.



The ActionLaser 1500's top speed is six ppm, fifty percent faster than others in the same price range. That's fast.



The ActionLaser 1500 comes standard with parallel and serial interfaces that allow two users to share a single printer. Add another interface and a third user can share the same printer. The ActionLaser 1500 can connect to everything from PCs to IBM mini-frame computers.



THE EPSON ACTIONLASER 1500



PC Computing Best Buy (June 93).
The word is getting around.
The Epson ActionLaser 1500 is the best choice in personal lasers.



It's easy to add more memory. Just pop in inexpensive, industry standard DRAM chips for a maximum of 5 MB.



PCL 5 is standard. The extra power of Adobe PostScript is a simple plug-in option.

The ActionLaser 1500 comes with Epson's limited two year warranty. For help, call the Epson Connection. Quite possibly the best help line in the business.



The only printer worth buying today is one that can take you into tomorrow. That's why we designed so many expandable features into the ActionLaser™ 1500. Test drive a few lasers. You'll soon discover the speedy, inexpensive ActionLaser 1500 is the one laser you want parked on your desk. For information on the Epson ActionLaser 1500, our ink jet and dot matrix printers, or scanners, call the Epson Connection™ at 1-800-BUY-EPSON (800-289-3776).

EPSON®



NetWare

It's big. It lets you find anyone, anywhere. And it's here. Industrial-strength networking reaches the masses.

BY JOHN MONTGOMERY

IT WON'T HAPPEN OVERNIGHT. In fact, when business is going through the roof, you probably won't even notice as your network s-l-o-w-s to a crawl. You'll be too busy adding staff to handle your company's increasing workload. Each newcomer gets a desk, a fast 486, an Ethernet card, and an account on the server, and they're off and running—ready to beef up an already fat bottom line.

But not for long. One day you'll stop to catch your breath, and you'll hear the unmistakable sound of fingers drumming on desktops. Routine transactions that used to happen in nanoseconds—calling up customer accounts, transferring files between servers, even sending simple e-mail—will seem to take forever. And it won't do any good to add more servers or upgrade to the fastest PCs money can buy. You've hit the wall of network performance.

Blame it on your network operating system. Because if you're running your company on an old-style NOS (and that includes the extraordinarily popular NetWare 3.11) you're tied to a server-centric system. Best suited to workgroup computing, such NOS's force all transactions through designated file servers. As more users share resources across more servers, your network becomes

fiendishly complex and less secure. Users must log on to a cascade of file servers to reach the information they need—leaving a trail of account names and passwords in their wake. Administration becomes an onerous job.

Sooner or later, you'll have to explore NOS's that are built for the enterprise, such as Novell's new NetWare 4.0. Designed specifically for large networks, NetWare 4.0 supports 1,000 nodes, treats a skein of servers as one, and lets users hopscotch across different servers with one account name. Along the way, Novell teaches competitors Microsoft and IBM a few things about doing networks right, and gives enterprise rival Banyan a run for its money. And that's the point, really. An industrial-strength NOS will not only propel your company on a fast, upward growth curve but will save you endless dollars in maintenance costs.

DISTINGUISHING FEATURES

Different NOS's suit networks of different sizes. The feature that determines how well a NOS fits your business is the directory service. Like an electronic phone book, the directory service lists every person, printer, and volume on the network. With this feature's sophistication as

THE NEW NETWORK HAS A USABILITY EDGE

Any network resource is just a step away.

With NetWare 3.11 you had to log in to each server on the network individually. With Release 4.0 you log in to one centrally managed network.

NETWARE 3.11



LOG IN: Enter a log-in name and password to connect to your home server, EXEC.



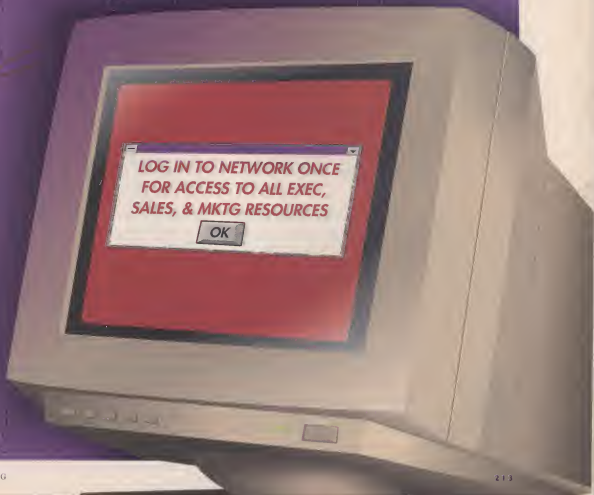
LOG IN AGAIN: To access data on the SALES server, log in again, with a different name and password.



AND AGAIN: To connect to the MKTG server, do it again. Repeat for every server on the network.

NETWARE 4.0

LOG IN ONCE: NetWare 4.0's graphical utility greatly simplifies the process. As soon as you log in, you have immediate access to all network resources. Thanks to centralized network management, you accomplish in one step what once took many.



a yardstick, NOS's fall into three general—and often overlapping—categories: workgroup NOS's, medium-size business NOS's, and enterprise NOS's.

- **Workgroup NOS's** use a directory service a lot like a single-city phone book: You can find people in your city, but that's it. NetWare 3.11, with its Bindery-based directory, is a workgroup NOS. Users log in to one server at a time and gain access to resources (printers and modems, for example) on that server. You must add each user to every server the user needs to access—an unwieldy arrangement for networks with five or more servers.

- **Medium-size business NOS's** use more sophisticated directory services, rather like a county phone book. These

can access any resource on any server (assuming they have rights issued by the administrator). They don't have to know which server a printer is connected to or whether a particular server is in their domain. No one has to modify their log-in files or do anything esoteric: They're in.

SMART DECISIONS

When you're hunting for a NOS, guidelines are only so helpful. Using a rule of thumb to buy a NOS is like using a compass to steer a car: It'll point you in the right direction, but you still need to pay attention to the road or you could plow into a tree. That said, there are some signs you can use to gauge your needs.

- **Improved productivity** is always the ultimate goal. The NOS you choose should bind the PCs on your network so that they function as a single entity. You want your network to behave like an easy-to-use mainframe. In fact, the idea is to have it do more than a mainframe could and for less money. As your network expands, you will need a more powerful NOS to achieve this kind of coherency.

- **Upgrade costs** are your next concern. Even the simple upgrade from NetWare 3.11 to NetWare 4.0 will take a lot of time—perhaps a couple of weeks if you have 100 servers—although Novell went to great lengths to make it easy. Converting from another vendor's NOS to NetWare 4.0 could be prohibitively expensive, however. After all, you must not only purchase the new NOS but also pay for the staff time required to upgrade both servers and clients, then for time to debug anything that doesn't work.

- **Explore alternatives.** If you have an enterprise network, for example, remember that Banyan has been playing on this field a lot longer than Novell and has two great products to show for it: VINES, a complete NOS, and Enterprise Network Services (ENS), an add-

on for NetWare 3.11 that will work with NetWare 4.0 and Windows NT Advanced Server later this year. ENS has tremendous potential because it can make NOS's from different vendors work together as if they were one.

The long and short of it: NetWare 4.0 will make it easier for users to get at resources, and it will simplify network managers' lives. This helps keep productivity up and administrative costs down. But NetWare 4.0 isn't for every business. It's a lot more complicated to set up than its predecessor. If relatively minor shortcomings are driving you to upgrade, NetWare 3.2—the upgrade to 3.11 due later this year—might solve them in a far simpler fashion.

NetWare 4.0 is a superset of the world's most popular NOS and appropriate only for companies that need to simplify administration of many networks. Whether you're ready now—or will be soon—NetWare 4.0 is worth a look.

NETWARE 4.0'S PAYOFF

Easy to use, easy to administer.

Novell designed NetWare 4.0 specifically to support and manage large global LANs. Speed, directory services, and fault tolerance give it a huge edge over the enormously popular NetWare 3.11.

IMPROVED USABILITY

- Users can get into multiple servers with just one log-in.
- Network managers no longer need to create user accounts for every individual server; a single account works for all servers.
- Compliance with the X.500 industry standard makes it easier to locate users on other networks.

TIGHTER SECURITY

- A network auditor maintains a trail of who accessed files when.
- Built-in encryption hides account data from prying eyes.
- Fault-tolerant backup and restore protects data.

LOWER COSTS

- Global directory services greatly reduce administrative overhead—both time and money.

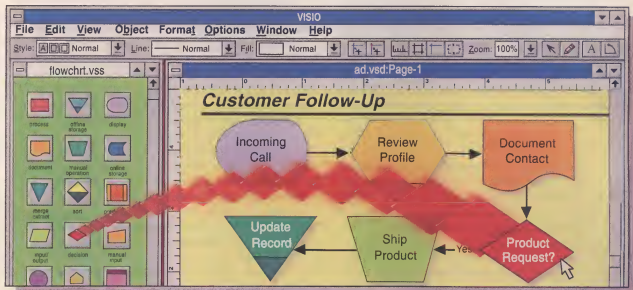
FASTER PERFORMANCE

- A single server can handle larger client loads.

NOS's, including IBM's LAN Server, Microsoft's LAN Manager, and Windows NT Advanced Server, join several servers into a domain. When users log in, they have access to any resource on any server in a given domain. Users still need to know which server the printer, modem, or disk drive is attached to, but the domain handles all security precautions for the servers within it. It's a clever system, but not infinitely extensible: Users and administrators still have to know where the resources are (a problem when you knit a dozen servers into one domain). Also, getting two domains to work together can be a nightmare.

- **Enterprise NOS's** directory services are like a global phone book: You can look up anyone, anywhere. That has been the outstanding feature of Banyan VINES for years. Now, Novell offers its own global directory with NetWare 4.0. When users log in anywhere in the enterprise, they

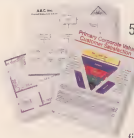
VISIO IS FOR ANYONE WHO THINKS DRAWING IS A DRAG.



Now you don't have to be a graphic artist or draftsman to create impactful business and technical drawings. Because *if you can drag and drop, you can draw*. It's that easy with Visio™, Shapeware's™ breakthrough drawing program for Microsoft® Windows™ 3.1 users.

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Visio Sampler is a working model of our award-winning program. Sampler lets you drag and drop shapes to create your own drawings as fast as you can conceive them. To get your hands on Sampler and test drive Visio for yourself, call Shapeware for details at 1-800-446-3335, ext. CK8.

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1-800-446-3335, ext. CK8



Is It Time to Upgrade?

For fast-growing networks, NetWare 4.0 offers distinct advantages over 3.11.

LET'S BE HONEST: Migrating to NetWare 4.0 from 3.11 will hurt. It will require months of planning, cause scores of disruptions, and teem with unforeseen costs. But once implemented, your network will be able to grow as fast as your company does. It will use fewer resources, provide much better security, and make administration worlds easier. Ultimately, once the pain subsides, you'll find that 4.0 can save you a fortune.

Upgrading isn't for everyone, especially since Novell will support its 3.x generation of networks well into the future (there's no one-step upgrade from NetWare 2.x to 4.0, although Novell has provided decent tools to make the leap). In deciding whether to upgrade, you should consider how fast your organization is growing—especially in diverse geographical locations—and how much your company will access shared resources across servers, both today and six months from now. NetWare 4.0 allows you to spread large LANs across the globe on a scale that few other network operating systems can match.

If your network users share resources across no more than four servers in fewer than four locations, NetWare

4.0 is overkill. Retraining costs for network support staff alone are too high. Likewise, networks in which three of four clients are Macintoshes won't benefit much from 4.0. And if your clients are exclusively Windows machines, Microsoft's various NT and Windows for Workgroups offerings can provide cost-effective alternatives (see "Enterprise Network Operating Systems," page 230).

Release 4.0's feature set also should guide you in determining whether to move from 3.x. The new NetWare Directory Services let you see your network as a single entity, rather than a collection of disparate servers and devices. The data-migration capabilities dramatically lower storage costs. Because it better utilizes Intel's 386 architecture, NetWare 4.0 reduces the frequency of system crashes. It provides richer security features and requires less time and hassle for users and administrators.

GOOD-BYE, SERVER-CENTRIC NETWORK

The single feature that sets NetWare 4.0 apart from other versions of Novell's operating system—and that plants it squarely in the camp of enterprise computing—is



Hands

That kink you feel in your wrist from typing at your computer could lead to painful tendinitis or even carpal tunnel syndrome so help reduce the strain keyboarding puts on

NetWare Directory Services (NDS). To appreciate NDS, you should understand how previous NetWare versions organize user names, passwords, rights, and groups.

Under NetWare 3.x, each server has its own Bindery, a flat-file database of names, passwords, and so on. To access any resource on a server, your name must be included in that server's Bindery. You have to know the name of the server, and accessing each server requires a separate log-in. To submit a job to a printer in another building, you may have to know the names of both the server and the print queue. Additionally, these resources may require a different log-in name and password—all of which you and the LAN administrator must keep track of.

In companies with more than five servers, or with personnel that constantly changes locations (or jobs), this system causes tremendous confusion, high administrative housekeeping costs, and data redundancy. It's nearly impossible for system administrators to keep all Binderries current with all personnel and resources, although 3.11's NetWare Name Service (NNS) at least provides a slow and kludgy way to synchronize Binderries. NNS copies Binderries across multiple servers—each server's Bindery is an exact replica of every other server's Bindery. This system leads to unnecessarily large Binderries that contain all sorts of extraneous information.

NDS replaces the Bindery altogether, organizing resources in a one-stop shop: You log in to the network once, not several times to individual servers. Once you've logged in, you're automatically connected to all the network resources that your administrator has made available to you. No longer do you seek out specific servers for files or peripherals. To switch print queues, you don't need to know the names of the servers or queues. NDS provides an enterprisewide directory of all network resources: users, servers, printers, and other peripherals. Gone forever is the notion of a server-centric network.

For the administrator, NDS streamlines 3.11's 130 utilities into about 50. It's a welcome consolidation. SYSCON, DSPACE, UNDERDEF, and SECURITY have been combined into NETADMIN (for DOS) or NWADMIN (for Windows), a graphical utility that allows administrators to look at the entire network from a single view. Now you drag and drop people, resources, and other objects to new locations, and issue rights through standard Windows check boxes. It's a much easier way to administer the LAN.

SMART WAREHOUSE

Version 4.0's storage-management methods further reduce administration headaches—and costs. In this arena 4.0 beats previous versions of NetWare hands

your hands with our rounded, cushioned, height-adjustable wrist rest.



Wrist Rest

ergodyne  WorkSmart

software for your hardware 1-800-323-0052

Circle 160 on reader service card.

down. On-the-fly compression makes its debut—and NetWare 4.0 is the first network operating system to provide it. Compression and decompression are automatic, quick, and compact using Novell's proprietary algorithm. Files are compressed when closed and decompressed when opened (server files only, of course—compression doesn't work on your local hard drive). NetWare provides multiple compression options for administrators who are nervous about preserving the integrity of data in a directory or on a drive.

ZD Labs was able to compress nine database files occupying 17MB to less than 2MB in our tests. Novell claims that compression can save up to 60 percent of disk space, although the amount you actually reclaim depends greatly on the type of data. As companies increasingly fill server drives with desktop publishing files, video images, multimedia presentations, and other piggy data types—at \$1 to \$2 per megabyte of SCSI drive space—compression can save thousands of dollars in storage capacity across an enterprise.

You pay a performance penalty for compression, but we were surprised at how small it is. Most applications open only a small part of a large file anyway—thus limiting how much data must be decompressed. You can set compression to work only when the server's CPU is idle,

so that the performance penalty is imperceptible. The biggest performance hit (and it's not too bad) comes with spreadsheet and graphics programs: In our tests, an uncompressed 1MB Excel spreadsheet took 14.5 seconds to load; compressed, it required 18 seconds.

But compression is only one part of the cost savings in storage offered by Version 4.0. The operating system also provides data migration, which means files that haven't been accessed for a specified time period automatically get moved to less expensive storage devices, such as optical disks or tapes (see "When Every Megabyte Counts," at right). This migration process is entirely invisible to users, who still see the files on the network drive where they originally stored them—even though the files aren't physically there. When they call up the files, they are automatically moved back to the magnetic drive. Clearly, this system can result in poor performance when you call up an archived file. But you'll gain hard disk space and keep the disk unfragmented, both of which are too important to ignore.

Servers can begin migrating data not only according to time parameters, but also when free disk space falls below 10 percent, for example. You can exclude certain files and directories as well. This is particularly useful for networks that store large multimedia presentations and other individual files that occupy 10MB or more.

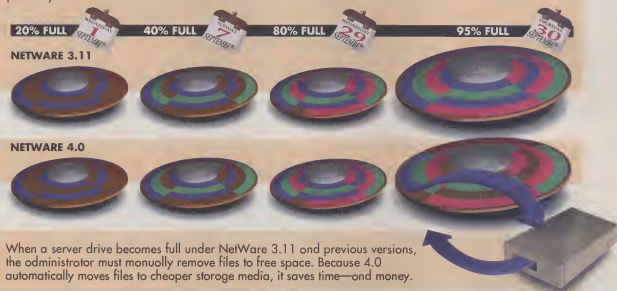


Slumping, slouching or sagging posture while seated at your computer can be related to the position

WHEN EVERY MEGABYTE COUNTS

NetWare 4.0 saves disk space and dollars.

Data migration automatically moves seldom-used files from expensive server hard drives to cheaper storage, such as optical drives or tape. Which files get moved—and when—are preset by the network administrator.



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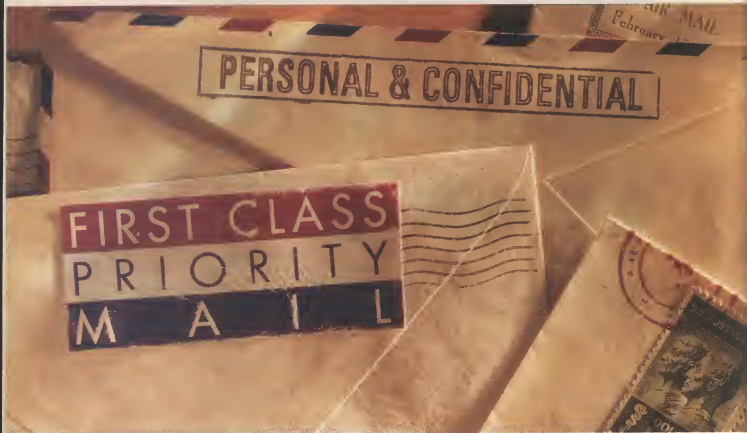
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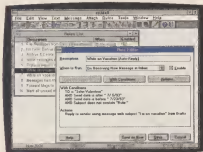
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had you reading about the company bake sale, while crucial, time-sensitive communications waited to be read.

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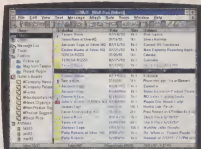
or your Inbox. And smart windows let you save your view preferences. Smarticons® let you move seamlessly into other Lotus applications with one click. Additional mail management is provided through ccMail's powerful search capabilities. There's even a built-in spell check that will automatically check your messages before you transmit them.

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Unfortunately, migration isn't without drawbacks. It doesn't work with OS/2 HPFS or Macintosh files. And the number of devices to which you can migrate data is currently limited: HP's C17XX optical jukeboxes, SCSI devices (via Adaptec's host adapters), and a few others. In addition, NetWare won't move compressed files directly to tape; it first decompresses them, then sends them to the tape drive, where they are compressed again.

SAFE SIDE OF THE ROAD

Still, earlier versions of NetWare have nothing that even approaches this capability. Likewise, new to 4.0 is the ability to load NetWare Loadable Modules (NLMs)—programs that perform various LAN services like printing and backup—into protected pages of memory, where they're separated from the NetWare operating system kernel. This greatly reduces the likelihood that a faulty NLM will bring down the server (see "An Extra Layer of Network Protection," below).

Unfortunately, not all NLMs run in protected mode, which means that many must be tested before installation—just as all NLMs must be tested on 3.x networks. When deciding whether to upgrade, you should consider not only how many NLMs you plan to run, but which ones you plan to install into the faster, less protected memory.

As with 4.0's other features aimed at avoiding network crashes, the security features are designed to reduce network downtime by protecting your organization from fraud or sabotage. In 4.0 you can restrict

log-ins to specific workstations. Passwords are now encrypted according to the Rivest-Shamir-Adleman (RSA) industry standard. Remote console session security, which is the ability to operate a file server from a workstation or over a phone line, now has password encryption and a callback feature in which the server calls the network administrator back at a preset phone number. And there's now a Network Auditor that tracks key events, such as the specific times a user logs in or requests particular network services.

For smaller networks, the security features in 3.x may prove adequate. The same is true with adding new clients to the network. Novell's Open Datalink Interface (ODI) drivers, which were used as options in previous versions of NetWare, are now mandatory in Release 4.0 if you want full use of NDS. ODI drivers are easier to configure and administer, keeping costs down for distributed networks. The older IPX drivers required the network administrator to set up each driver depending on the particulars of the card. Now administrators need only change a single adapter driver, rather than recreate a new IPX file for every card configuration. In other words, ODI allows you to run multiple protocols and frame types over a single network adapter. Want to connect to both NetWare and Unix workstations? No problem.

If you're using Microsoft's Network Driver Interface Specification (NDIS) drivers on your clients, don't despair—you still can. The caveat is that you'll have to run

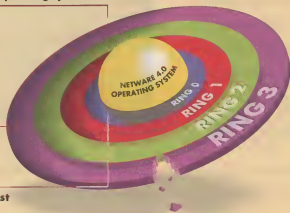
AN EXTRA LAYER OF NETWORK PROTECTION

NetWare 4.0 moves risky processes where they can't crash the network.

NetWare Loadable Modules (NLMs) perform essential LAN services like backup, printing, and fax management without additional application servers. Before NetWare 4.0, however, a buggy NLM could crash a server.

Intel CPUs divide memory into four protected pages, or rings, separated by a protective barrier. The higher the ring number, the less chance an application there will crash the operating system.

Unlike NetWare 3.11, NetWare 4.0 lets you load NLMs into outer rings, where a crash is less likely to affect the kernel. Application speed will suffer—how much depends on the size and complexity of the individual NLM.



The NetWare kernel loads in ring 0, the least protected but fastest and most efficient.

them on top of the ODI drivers with a special converter provided by Novell. This procedure sucks up memory in the client and degrades its network performance.

USERS BENEFIT TOO

Keeping a lid on administrative costs is fine, but the real payoff of networks comes from user benefits. Novell has done a commendable job of integrating 4.0 into Windows. It requires a new series of dynamic link libraries (DLLs) and other files, but installation is handled automatically by the NetWare 4.0 Windows installation routine, including updates to both INI files—that is, as long as you run Windows from your local hard drive. If you run Windows from the network, you must first copy the files that the installation routine adds to \WINDOWS\SYSTEM to wherever your system files are stored on the network. Novell is working to correct this minor glitch.

Meanwhile, companies deeply committed to NetWare 3.x have good reason to pause before making the leap to 4.0. System Fault Tolerance level 3—in which two servers work in tandem so that if one goes down, the other continues—has been available in NetWare 3.x for some time. However, it won't be ready for 4.0 until later this year. Many NLMs that run under 3.x are incompatible with 4.0. And retraining system administrators for 4.0 is no small project; it requires a giant leap in psychology from Bindery-based networks to directory services. But for fast-growing companies with widely distributed resources, it's a leap that's well worth the cost.

NetWare 4.0

5 users, \$1,395; 10 users, \$3,195; 25 users, \$4,695; 50 users, \$6,295; 100 users, \$8,795; 250 users, \$15,695; 500 users, \$26,395; 1,000 users, \$47,995 • Novell • 122 E. 1700 South, Provo, UT 84606 • (800) 847-0240, (801) 429-7000

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SHOULD YOU FIGHT OR SWITCH?

The larger the network, the more attractive you'll find NetWare 4.0.

| | NetWare 3.11 | NetWare 4.0 | The Bottom Line |
|------------------------------|---|--|--|
| COST | \$2,495 for 10 users (\$249.50 per node); \$6,995 for 100 users (\$69.95 per node); \$12,495 for 250 users (\$49.98 per node). | \$3,195 for 10 users (\$319.50 per node); \$8,795 for 100 users (\$87.95 per node); \$47,995 for 1,000 users (\$47.99 per node). | 4.0's cost structure clearly favors larger LANs (as does its feature set). |
| DIRECTORY SERVICES | Bindery Using multiple servers requires huge administrative overhead. The WAN support is awkward and via third-party utilities. The single-server management approach is fading fast. | Distributed database Version 4.0 is based on the CCITT X.500 messaging standard. It features graphical network management utilities and uses Bindery emulation for NetWare 3.11 servers. | Implementing NetWare 4.0 reduces your administrative costs after the initial investment in time and money has been made. It also offers better integration of departmental networks into enterprise. |
| SECURITY | Version 3.11 employs a four-part system: password protection, variable rights assigned to users, file and directory locks, plus central over file-server access. | NetWare 3.11 includes everything in 3.11, and adds resource auditing capabilities and RSA public/private key cryptography. | Key encryption is the best security system available and auditing provides complete lists of who uses which resources when. But all of this is overkill for smaller networks. |
| SOFTWARE AVAILABILITY | Relatively few NLMs are currently available for 3.11. The major players are Oracle and ArcServe. | Novell says 90 percent of 3.11 NLMs will work on 4.0, and NLMs written expressly for 4.0 are trickling in. | All NLMs need to be tested on 4.0 servers—those that don't work need to be recompiled or dropped. |
| PERFORMANCE | NetWare 3.11 is one of the fastest networks around. | The new NetWare's performance ratings are consistent with 3.11's. | There were no performance differences under equivalent loads, but NetWare 4.0 slumps with 1,000 or more users. |

Cast Your Networking Ballot

NetWare 4.0 is not the only enterprise option. Check out the leading contenders.

DECISIONS, DECISIONS. You know you need an enterprisewide network operating system—something that holds your company together with more than spit and baling wire—but your universe of choices keeps expanding. It's as if you were watching an election in which new candidates keep entering the race. There's NetWare 4.0 as the populist contender, Banyan's VINES and Banyan's add-on for NetWare, ENS, as the respected incumbents, and entries from IBM and Microsoft as the heavily backed competitors.

Before you cast your vote with your company's dollars, it's worth sizing up the candidates by their promises and their track records. After all, it's an election that bears directly on your business.

BANYAN VINES 5.5

Pros: Powerful directory service, easy to manage.

Cons: Lack of third-party applications.

Banyan's VINES, NetWare's foremost rival in enterprise networking, definitely has what it takes technically—and has for many years. Unfortunately, poor marketing and a lack of applications have kept VINES out of many companies. VINES 5.5 is a superb competitor of NetWare 4.0 in terms of ease of use and management, but it lacks NetWare 4.0's disk compression and application catalog.

The power of VINES lies in its StreetTalk III directory service, a powerful enterprise-naming scheme that's relatively easy for users to understand and work with. StreetTalk III users log in to the network, rather than to a particular server, just as NetWare 4.0 users do.

The power of StreetTalk III can be understood with a simple example: adding a new server to the network. To accomplish this, you must get other servers to recognize the new one, and then you must add users and resources to it. Under most network operating systems, this is an immense undertaking. With VINES, the network manager simply adds the server's address to another server's resource list and its vital statistics are replicated throughout the network. StreetTalk III will give users access to any resources on the new server they need.

As far as security goes, VINES encrypts both passwords and data without requiring third-party add-ons. It's the only network operating system with this ability.

Indeed, VINES could give NetWare 4.0 a run for its money. It would be an even better opponent if it had more applications and could match NetWare 4.0's built-in disk compression. Until it gains these features, NetWare 4.0 is the better buy.

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BANYAN ENTERPRISE NETWORK SERVICES

Pros: Powerful directory service, highly portable, links disparate network operating systems.

Cons: Currently runs only on NetWare 3.11.

Early this year, Banyan turned StreetTalk III into a NetWare Loadable Module—an application that runs under NetWare 3.11—calling it Enterprise Network Services, or ENS. Although technically not a network operating system, ENS is an innovation arguably more important than NetWare 4.0 itself.

Banyan's ENS allows you to maintain your existing network operating system, and augment it with the excellent directory services available with VINES. It's truly the best of all worlds.

More important, ENS is a lingua franca for disparate network operating systems. It means that NetWare 3.11 networks running ENS could link up with VINES networks as though they ran the same network operating system. For sites running more than one network operating system, such a capability is a godsend. To make matters rosier, Banyan is working

NETWORKSPEAK

What's it all mean, anyway?

BINDERY: A flat-file database in NetWare 3.11 and earlier versions that stores the names of all resources and people connected to a specific server.

HCSS: The High-Capacity Storage System is part of NetWare 4.0's data-migration system; it automatically moves data from the server's hard disk to less expensive optical "jukeboxes" (optical discs on an auto-changer).

NETBEUI: The NetBIOS Extended User Interface is basically NetBIOS with a small change to boost performance.

NETBIOS: A transport protocol, NetBIOS is a lightweight network protocol best suited to very small LANs.

NETX: The equivalent of COMMAND.COM for NetWare, NETX is the program on top of which network shells run.

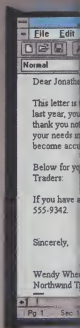
NLM: A NetWare Loadable Module is software that provides additional server functions in a NetWare LAN, such as printing, data backup, or fax management.

RSA: A highly secure encryption standard that uses a two-part key. It's named for the people who created it—Rivest, Shamir, and Adleman.

VLM: New to 4.0, Virtual Loadable Modules do for clients what NLMs do for servers. Best of all, the NetWare device driver that ships with Windows 3.1 lets you switch servers and network printers or receive messages from within any Windows application.

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ENTERPRISE NETWORK OPERATING SYSTEMS

Big networks demand easy maintenance, good security, and simple access.

| | NetWare 4.0 | VINES 5.5 | LAN Manager | LAN Server |
|-----------------------------------|--|--|---|---|
| COST PER 5 DOS CLIENTS | \$1,395 | \$1,495 | \$1,995 | \$2,865 |
| COST PER 1,000 DOS CLIENTS | \$47,995 | \$8,495 | \$66,995 | \$77,490 |
| DIRECTORY SERVICES | Global NetWare 4.0's NDS is complex but powerful; designed to resemble a tree. | Global VINES 5.5 employs a powerful, easy-to-use directory structure. | Domain LAN Manager's domain-based directory is good for small to medium networks. | Domain LAN Server uses a domain-based directory structure nearly identical to that of LAN Manager. |
| SECURITY | NetWare 4.0's main security feature is access control lists, which allow individuals or groups to access network resources. | In addition to encrypted passwords, VINES 5.5 is the only product we looked at that can encrypt data as it goes over the network without a third-party add-on. | LAN Manager has the security features you'd expect from a network operating system, including password encryption and audit trails. | LAN Server has essentially the same security features LAN Manager has. |
| SOFTWARE AVAILABILITY | It's a very new product and, without patches and extensions from Novell to run 3.11's NLMs, it's nearly devoid of applications. But that will change soon. | Despite its maturity, only a small number of applications are available compared to all the NLMs available for NetWare 3.11. | LAN Manager has some interesting apps, including a version of SQL Server, but its catalog is still a bit bare compared to NetWare 3.11's. | Compared to NetWare 3.11, LAN Server doesn't have many applications. |
| PERFORMANCE | NetWare 4.0 follows in the footsteps of the superfast NetWare 3.11, delivering excellent performance. | VINES 5.5 is certainly a better performer than its predecessors, but still no match for Advanced Server or NetWare 4.0. | Due to disk cache problems, LAN Manager delivers high performance only under light client loads. | LAN Server 3.0 has the same problems as LAN Manager, but isn't quite as fast. |

on versions of ENS for NetWare 4.0 and Microsoft Windows NT Advanced Server.

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MICROSOFT LAN MANAGER

Pros: Good performance.

Cons: Mediocre directory services, currently runs under old version of OS/2.

Microsoft's LAN Manager 2.2 is a worthy candidate, but it stands little chance of winning much support as long as

NetWare 4.0 is on the scene. Its main problem is that Microsoft didn't think big enough in designing it. LAN Manager's directory system uses domains—groups of servers and clients related to each other by a business need you specify. Users log in to their domain, then have access to resources on any server in that domain.

Domains work well if users need access to resources only within their respective domains. But if you need to connect to another domain, the network administrator must give you an account in it. It's done on a per-user basis, so companies with considerable cross-domain pollution will have a network-management nightmare.

Speaking of bad dreams, LAN Manager runs on OS/2

**Windows NT
Advanced Server****The Bottom Line**

\$1,745

With only a limited number of nodes, each network stacks up relatively evenly.

\$51,445

Large networks give VINES a distinct price advantage.

Advanced Domain
NT improves LAN Manager's domain directory with better interdomain communication.

Domains group servers together—an advanced form of workgroup computing. But global directories group all users into a single database—the essence of enterprise computing.

The key of Advanced Server's security is its thorough audit trails, which show everything about what users do on the network.

For large networks, encryption and a good audit trail are the linchpins of effective security.

Advanced Server has the same problem as NetWare 4.0: It's new, so there are few applications. In time, it should have a large catalog.

Although the field is currently wide open, that should change quickly. Best bet? NetWare 4.0 and NT.

Even with only one processor, Advanced Server delivers solid performance; engage two and it takes off, rivaling NetWare 4.0.

NetWare and Advanced Server own the field in terms of performance.

1.3, which has a limit of 16MB of memory and must accommodate the OS/2 operating system, LAN Manager, applications, and any disk cache. Because most other network operating systems don't have this limit, they can accommodate larger disk caches, which boosts network performance considerably.

It boils down to this: If you're considering LAN Manager, look at Microsoft's Windows NT Advanced Server as well. Advanced Server fixes some of the LAN Manager's limitations and offers many other pluses as well.

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IBM LAN SERVER

Pros: Runs on latest version of OS/2.

Cons: Mediocre directory services.

Every election has at least two barely distinguishable candidates. In this case, they're LAN Manager and LAN Server. Historically, IBM's LAN Server was just a repackaged version of Microsoft's LAN Manager. With Version 3.0, IBM claims to have redesigned the product. True, some menus are different, but it still feels like LAN Manager. In particular, IBM did nothing to improve the domain-based directory services or the remnants of the 16MB memory limitation. Domains in LAN Server 3.0 work just as in LAN Manager 2.2. In other words, the program is not advised for large networks, especially if users frequently need access to several domains.

Our recommendation for large networks is to look elsewhere. Consider NetWare 4.0, Windows NT Advanced Server, and VINES before looking here.

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**MICROSOFT WINDOWS NT ADVANCED
SERVER**

Pros: Multiprocessing, good directory services, fault tolerant.

Cons: Lack of applications.

NT Advanced Server is Microsoft's strategic direction for large networks. With a multiprocessing, multithreaded, multieverything design, it has the potential to be a superb network operating system. Though it's currently short on applications, in a year store shelves should be stocked.

The key advantages Advanced Server has over other systems are multiprocessing and fault-tolerance features. When you add processors to an Advanced Server system, you'll see an immediate performance improvement.

Advanced Server's fault tolerance includes disk mirroring and *striping* (a method of boosting performance by interleaving sectors from multiple disks), both of which are unbelievably easy to set up.

But multiprocessing and fault tolerance are just gravy. The meat and potatoes of a network operating system are its directory services—in this case, the domains. But unlike with LAN Manager, you can now extend user or group privileges beyond a domain by creating a "trust" relationship between a server in one domain and a server in another. When you log in to one domain, you get transparent access to any domains that "trust" it.

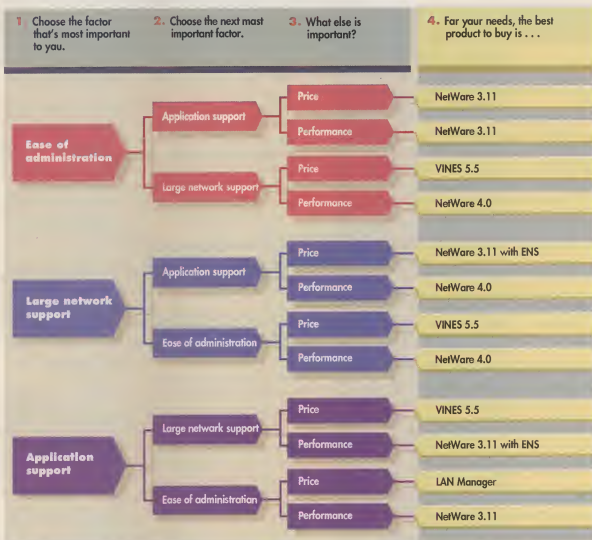
As such, Advanced Server joins VINES and ENS as truly worthy rivals to NetWare 4.0. Any of these products will leave you in very good hands indeed.

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PC/COMPUTING DECISION MAKER

Which network is right for your business?



FINAL ANALYSIS

NetWare 4.0 is a good, possibly great product. But should you upgrade?

For some businesses, installing NetWare 4.0 is the right thing. For others, it's inappropriate and expensive. Before you lay your money on the table, ask yourself some simple questions.

- **How big is your business?** Upgrading a network operating system does not guarantee improved productivity. Figure out how large your business is and how much you plan to grow in the coming years. The enterprise products can easily handle medium-sized business networks and may provide a better value with their potential for expansion.

- **Do you want to switch vendors?** Sticking with the same vendor means an upgrade probably will be easier. Vendors

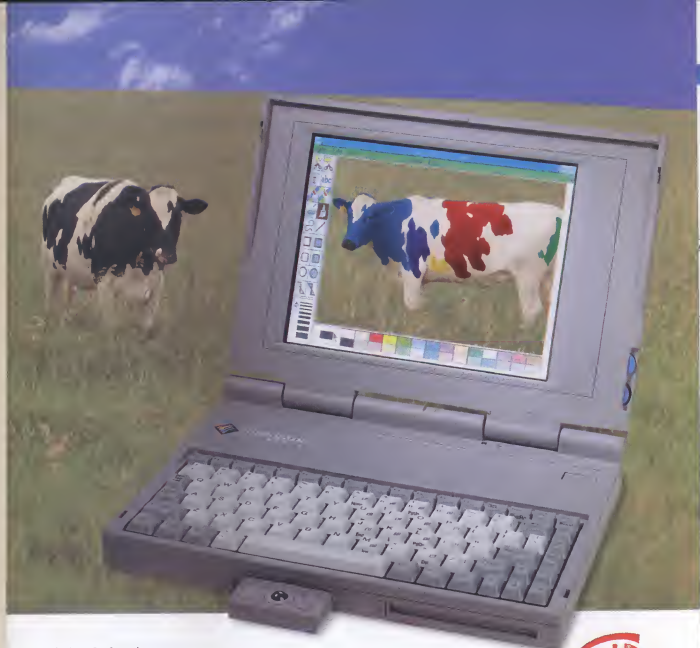
build tools and procedures to help with the migration, and it's easier to get technical support from a single vendor.

- **Are the applications you need available?** NetWare 3.11 has a tremendous library of third-party applications. NetWare 4.0 doesn't—at least not yet. Neither do Windows NT Advanced Server and Banyan VINES.

- **Do you have the resources to upgrade?** Hello, reality. Money makes the world go around, and if you don't have it, you'll have to wait. Upgrading one server from NetWare 3.11 to NetWare 4.0 takes a full day of paid labor—assuming nothing goes wrong.



The Choice Is
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inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs just 5.4 pounds.

486 Power

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The ColorBook includes a built-in track ball, which is much easier to use than a mouse in most portable situations. You also get two PCMCIA Type II card slots so you can plug in dozens of available PCMCIA peripherals.

Greener Pastures

The grass is greener on the ColorBook side of the fence! It's an extraordinary value even by Gateway's standards — and we wrote the book on value! We have a reputation for offering the best prices on high-quality products with exceptional service from friendly folks in the Midwest. That's why the choice of a computer supplier is black-and-white, even when you're buying a color notebook! Give us a call.



8 0 0 - 8 4 6 - 2 0 2 5

Introducing The ColorBook!



For the same money, you can have a black-and-white 486 notebook. Or you can have a color 486 notebook. Which is it going to be? Hay, it's not too hard to spot the best deal: the ColorBook from Gateway 2000! The new ColorBook has everything you're looking for in a portable at a price you'd expect to pay for a monochrome system. That's a special breed!

Exploding The Myth

Why do you expect to pay so much more for a color portable? Because other manufacturers always charge a plump premium for color. They've been milking the market, brainwashing you into thinking high-quality color costs a lot more to manufacture. It doesn't! We're selling the ColorBook for our usual cost-plus-small-margin. Now other companies will have a hard time perpetuating the color portable price myth. (Competitors absolutely *hate* us! Isn't it great?)

Experts' Reaction

We gave several PC trade publication editors a sneak preview of the ColorBook. Here's what they said about it: "Way cool!" "Dead on." "You won't be able to make enough of these."

Dazzling Color Display

The editors were impressed by the bright, crisp color graphics from the latest-technology, dual-scan STN display. It's a 9.4-inch VGA LCD, backlit for use in any lighting conditions. The editors said the ColorBook has the best STN color display they had ever seen! When they learned one model was priced *less than \$2,000*, they were convinced the ColorBook will cause a stampede in the industry.

No Compromise On Size

Adding color to a portable usually means adding weight and bulk. Not so with the Gateway 2000 ColorBook. The ColorBook is the thinnest color notebook on the market — 1.77

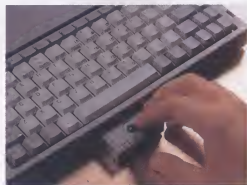
Introducing The ColorBook!



The ColorBook is the thinnest color notebook on the market — 1.77 inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs just 5.4 pounds.



You'll appreciate the convenience of using PCMCIA cards. They're as easy to carry as credit cards, and they plug right into your ColorBook.



The integrated track ball slides out from a compartment in the space bar on the keyboard. You simply pull it out and go to work. Finished? Just slide the track ball back into the ColorBook.



8 0 0 - 8 4 6 - 2 0 2 5

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Sales Hours: 7am-10pm Weekdays, 9am-4pm Saturdays (Central Time)

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Prices and configurations are subject to change without notice. Prices do not include shipping.

FEATURES

Size

With the ColorBook, you get great color at a great price while maintaining excellent portability.

Intel® 486 Processor

ColorBook notebooks are based on Intel 486 microprocessors, which makes them powerful enough to serve as your desktop PC with an external mouse, keyboard and monitor. Supports simultaneous video, up to 1024 x 768 resolution.

Dual-Scan STN Color Display

Dual-scan STN color is the latest technology in portable color displays, and it looks fabulous! You get 256 colors with the ColorBook running in VGA mode (640 x 480 resolution).

PCMCIA Type II Slots

Add a modem, network card or any of dozens of available PCMCIA-compatible peripherals. The ColorBook's two Type II slots can also be used for one Type III PCMCIA card.

COLORBOOK 486SX-25

- Weight: 5.4 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- Intel 25MHz 486SX Processor
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- 80MB IDE Hard Drive
- 9.4" Backlit VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Mouse Ports
- External CRT Port
- MS-DOS® and Windows™

\$1995

COLORBOOK 486SX-33

- Weight: 5.4 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- Intel 33MHz 486SX Processor
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- 170MB IDE Hard Drive
- 9.4" Backlit VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Mouse Ports
- External CRT Port
- MS-DOS and Windows

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- Call For Details

COMBO PACK

- 124-Key AnyKey Keyboard
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 - 15" Color CrystalScan 1572FS
- \$499**

Options include: PCMCIA fax/modem cards, PCMCIA network cards, 4MB or 16MB RAM upgrades, carrying case and extra NiMH batteries. Call for details.

The Complete MS-DOS 6.0 Command Reference

By Jeff Prussac and Ruffy Newman

The documentation that Microsoft forgot to provide. New, updated, and Windows-ready commands—plus power tips from the pros.

THE RICH GET RICHER. Microsoft's DOS 6.0 release has been blasting off the shelves. More than 5 million copies have already been sold this year, making it one of the most successful software releases ever.

Version 6.0 isn't the momentous upgrade that DOS 5.0 was. Microsoft has tossed in some useful (but intentionally crippled) apps and a fistful of truly powerful new and improved commands; the jazzed up MEMMAKER is almost reason enough to take the plunge. And its new configuration and startup abilities are well worth the ante.

But in a break with tradition, Version 6.0 cheated out and failed to include a command reference. Instead, it makes you use an enhanced but slightly clunky HELP command for online syntax, examples, and notes information on each command. You can order a separate DOS Resource Kit, but it's an extra \$19.95. Fortunately, our complete DOS 6.0 Command Reference fills the gaps. And we've added valuable tips and warnings to steer you through the DOS land mines.

About This Reference

Each entry in our reference guide includes the command name, a brief description of its purpose, and a detailed description of all the available options. We've noted whether the command is internal or external. Internal commands (like DIR and DEL) are loaded along with COMMAND.COM and are therefore available from anywhere within DOS; external commands (FORMAT and XCOPY, for example) are contained in separate files that must be copied to your hard disk and included in the DOS path to be used universally.

You can quickly look up how to use all of DOS 6.0's new commands, as well as those old commands that have been updated. We've used icons to highlight utilities, flag a handful of dangerous commands, and note the passing of commands that are no more with an RIP icon.

A Word About Syntax

We've used an industry-standard format to display the syntax of the commands in this reference. In every case, the name of the command appears first. Other elements that appear on the command line are mandatory unless contained within brackets. Elements in italics are placeholders for information you'll need to supply yourself. For example, *d:* represents any drive, *path* specifies a location in a drive's directory structure, and *filename* stands for the name of any file. The pipe symbol (|) separates two mutually exclusive choices on the syntax line. An ellipsis (...) means that the previous parameter can be repeated several times within a command.

Note: While this reference focuses on MS-DOS 6.0, IBM just released its own DOS upgrade. IBM's PC DOS 6.1 is the same as Microsoft's—almost. Some differences: IBM replaced Symantec's backup program with Central Point's, supplanted EDIT with E (another ASCII editor), and left out DBLSPACE in favor of a coupon for SuperStor/DS. Watch for our review of IBM PC DOS 6.1 in an upcoming issue.



New



Updated



Utility



Warning



RIP

MANAGING FILES:

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| | |
|--------------|--------------|
| ATTRIB | INTERLOCK |
| COPY | INTERSEVR |
| DEL (DELETE) | MOVE |
| DELTREE | REN (RENAME) |
| DIR | REPLACE |
| ERASE | VERIFY |
| FC | XCOPY |

MANAGING DISKS:

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|------------|------------|
| CD (CHDIR) | MD (MKDIR) |
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| DEFRAG | SUBST |
| DISKCOMP | TREE |
| DISKCOPY | |

WORKING WITH DOS:

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| DOSHELL | SET |
| EXPAND | SETVER |
| FASTHELP | VER |

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| | VSAFE |

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266

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| MORE | |

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| LOADFIX | |

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| CHCP | MSCDEX |
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| GRAPHICS | PRINT |
| KEYB | TIME |

PROGRAMMING:

287

| | |
|-------|--------|
| DEBUG | QBASIC |
|-------|--------|



N/A



Update



Utility



Warning



RIP

MANAGING FILES

ATTRIB Alter or display file attributes

EXTERNAL

SYNTAX

ATTRIB [+A| -A] [+H| -H] [+R| -R] [+S| -S] [[d:][path]filename] [/S]

| | |
|----------|---|
| +A, -A | Add/remove archive attribute. |
| +H, -H | Add/remove hidden attribute. |
| +R, -R | Add/remove read-only attribute. |
| +S, -S | Add/remove system attribute. |
| filename | Name of the file or files to process. |
| /S | Process files in the specified directory and its descendants. |

NOTE

The ATTRIB command is useful for setting or clearing archive attributes prior to executing a COPY or an XCOPY command; for removing read-only, hidden, and system attributes so a file can be deleted (or for setting them so that it can't); and for hiding files in directory listings by adding a hidden attribute.

**COMP** Replaced by FC**COPY** Copy a file or files

INTERNAL

SYNTAX

To copy a file or files:

COPY source [/A|/B] [destination] [/A|/B] [/V]

To concatenate two or more files:

COPY [d:][path]filename1 [/A|/B] + [d:][path]filename2 [/A|/B]
[+...] [destination] [/A|/B] [/V]

| | |
|-------------|---|
| source | Name of the file or files you want to copy. |
| destination | The destination for the copy. |
| /A | Treat the file as an ASCII file. |
| /B | Treat the file as a binary file. |
| /V | Verify that the data was copied correctly. |
| filename1 | Name of the file to copy. |
| filename2 | Name of the copied file. |

NOTE

To update a file's date and time stamp to reflect the current time and date, use the command

COPY filename /B +,,

DEL (DELETE) Delete a file or files

INTERNAL

SYNTAX

DEL [d:][path]filename [/P]

| | |
|----------|---|
| filename | Name of the file or files to delete. |
| /P | Prompt for confirmation before deleting a file. |

NOTE

You can make /P the default by using DOSKEY to create a macro equivalent to the DEL command. To do so, type

DOSKEY DEL=DEL \$1 /P

Note that deleted files may be recovered with DOS 6.0's UNDELETE command.

DELTREE Delete directory and all files and subdirectories in that directory

EXTERNAL

SYNTAX

DELTREE /Y [d:][path][filename]

| | |
|----|---|
| /Y | Bypass prompt for confirmation before deleting a directory. |
|----|---|

NOTE

DELTREE supports the use of wildcards. To delete all files and subdirectories on a floppy disk, type

DELTREE /Y A:*.*

If no filename is specified, this command deletes all files on the disk in drive A:, including all subdirectories; you will not be



prompted to confirm the action. If a filename is specified, DELTREE deletes it, regardless of its attributes (such as read only, system, or hidden). Eliminating the /Y switch so that DELTREE prompts you for confirmation may save you from a disaster.

DIR Display directory listing INTERNAL



SYNTAX

DIR [d:][path][filename] [/A:attr] [/O:order] [/B] [/L] [/P] [/S] [/W] [/C]

| | |
|-----------------|--|
| <i>filename</i> | Filename or file specification. |
| <i>/A:attr</i> | List files by attribute. Valid values for <i>attr</i> are <ul style="list-style-type: none"> A List files whose archive bits are set. -A List files whose archive bits are not set. D List directories only. -D List files only. H List hidden files. -H List files that are not hidden. R List read-only files. -R List files that are not read-only. S List system files. -S List files that are not system files. |
| <i>/O:order</i> | Sort the listing using the specified criterion. Valid values for <i>order</i> are <ul style="list-style-type: none"> C Sort by compression ratio (least compressed first). -C Sort by compression ratio (most compressed first). D Sort by date (oldest to newest). -D Sort by date (newest to oldest). E Sort by extension (alphabetical order). -E Sort by extension (reverse alphabetical order). G Display subdirectories first. -G Display files first. N Sort by name (alphabetical order). -N Sort by name (reverse alphabetical order). S Sort by size (smallest to largest). -S Sort by size (largest to smallest). |
| <i>/B</i> | List file and subdirectory names only. |
| <i>/L</i> | Display names in lowercase. |
| <i>/P</i> | Pause for a keystroke between screens. |
| <i>/S</i> | Search descendant directories. |
| <i>/W</i> | Display listing in wide format. |
| <i>/C</i> | Sort by compression ratio. |

NOTE

The /S switch gives you a way to search an entire disk for files matching a particular file specification. To list all files with the extension .BAK on the current drive, type

```
DIR *.* .BAK /S /B
```

To display a directory listing files in sorted order by compression ratio (for drives that have been compressed with the DoubleSpace utility), showing the least compressed file first, type

```
DIR /O:C
```

To show the actual compression ratio of files in the directory, use the syntax

```
DIR /O:CH
```

ERASE Delete a file or files INTERNAL



SYNTAX

ERASE [d:][path]filename [/P]

| | |
|-----------------|---|
| <i>filename</i> | Name of the file or files to delete. |
| <i>/P</i> | Prompt for confirmation before deleting a file. |

NOTE

The ERASE command is identical to the DEL (DELETE) command.

FC Compare files EXTERNAL



SYNTAX

```
FC [d:][path]filename1 [d:][path]filename2 [/A] [/B] [/C] [/L] [/LBn]
[/lines] [/N] [/T] [/W]
```



| | |
|------------------|---|
| <i>filename1</i> | Name of the first file. |
| <i>filename2</i> | Name of the file to compare it to. |
| <i>/A</i> | Abbreviate output from ASCII comparisons. |
| <i>/B</i> | Perform a binary comparison. |
| <i>/C</i> | Ignore case in the comparison. |
| <i>/L</i> | Perform an ASCII comparison. |
| <i>/LBn</i> | Set the size of the internal line buffer to <i>n</i> lines (default=100). |
| <i>/lines</i> | Number of lines that must match for FC to resynchronize after a mismatch. |
| <i>/N</i> | Display line numbers in ASCII comparisons. |
| <i>/T</i> | Do not expand tabs to spaces. |
| <i>/W</i> | Compress white space. |

NOTE

If FC has trouble resynchronizing after a mismatch when comparing ASCII files, increase the size of the line buffer with the */LBn* switch. FC can't resynchronize the files being compared if the mismatch exceeds the size of the line buffer.

**INTERLNK** Link computers to share resources **EXTERNAL****SYNTAX**

INTERLNK client:=server:

| | |
|----------------|---|
| <i>client:</i> | Drive letter of the connecting (terminal) drive being redirected. |
| <i>server:</i> | Drive letter of the host (server) being redirected. |

NOTE

Setting **INTERSVR** to load with */NOPRINTER*, */LPTx:*, and */COMx:* switches already specified will reduce the amount of memory **INTERLNK** will use as a device driver. Using **INTERLNK** to connect to a computer system that is not powered up will show three additional floppy disk drives instead of the contents of the redirected drives. To display the contents of drives that have been redirected, the **INTERSVR** program must have been loaded as a device driver in **CONFIG.SYS**.

**INTERSVR** Share resources among linked computers **EXTERNAL****SYNTAX**

INTERSVR drive: /X=drive: /LPT:#|address /COM:#|address /BAUD:rate
/B /V /RCOPY

| | |
|----------------------|---|
| <i>drive:</i> | Drive letter of the redirected drive. |
| <i>/X=drive:</i> | Exclude the drive letter specified. |
| <i>/LPT#:address</i> | Parallel port that is to be redirected, where <i>x</i> is the LPT port number and <i>address</i> is the hex address of the port (for example, 378 for LPT1 and 278 for LPT2). |
| <i>/COM#:address</i> | Serial port that is to be redirected, where <i>x</i> is the COM port number and <i>address</i> is the hex address of the port (for example, 3F8 for COM1 and 2F8 for COM2). |
| <i>/BAUD:rate</i> | Set baud rate for serial communications. Valid values range from 9,600 to 115,200. Default is 115,200. |
| <i>/B</i> | Display status screen in black-and-white mode. |
| <i>/V</i> | Prevent INTERLNK from conflicting with a computer's timer during serial connections. |
| <i>/RCOPY</i> | Copy files between two computers connected with null modem cables. The MODE command must be on the computer running the INTERLNK program. |

NOTE

If no port number for **LPT#** or **COM#** is specified, **INTERLNK** will scan all ports and use the first port it finds on the server.

**MOVE** Move files from one drive or directory to another **EXTERNAL****SYNTAX**

MOVE /Y source destination

| | |
|--------------------|---|
| <i>/Y</i> | Bypass prompt for confirmation before moving a directory. |
| <i>source</i> | Name of the file, files, or directory you want to move. |
| <i>destination</i> | The destination for the move. |

NOTE

Individual files can be moved from one directory or drive to another. Complete directories, including all subdirectories and files, can be moved and renamed from one directory or drive to another. **Warning:** MS-DOS will not warn you of the potential overwrite when moving files from one directory or drive to another where identical filenames exist.

REN (RENAME) Rename a file or files **INTERNAL****SYNTAX**

REN [d:][path]filename1 filename2



Around the world over nine million businesses share a common practice. They back up and store important data on quarter-inch data cartridges. And the brand they choose most is 3M. For good reason.

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- Free fax and data software for Windows® and DOS.



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Then take home a SatisFAXtion Modem. And all the honors will go to you.

intel®

filename1 Name of the file to rename.
filename2 New name for the file.

NOTE

The REN command can be used to rename a subdirectory without having to go to the DOS Shell. You can move and rename a file or group of files in a single operation. You can also move files and, in the process, rename a directory in a single operation. **Warning:** MS-DOS will not warn you of the potential overwrite when moving files from [path] to [path] where the same filenames exist.

REPLACE Replace existing files or copy only those not already at destination **EXTERNAL**

SYNTAX

REPLACE [d:][path]filename destination [/A] [/P] [/R] [/S] [/U] [/W]

filename Name of the file or files to copy.
destination Destination to copy the files to.
/A Add new files instead of replacing existing files.
/P Prompt for confirmation before replacing or creating a new file at the destination.
/R Replace read-only files.
/S Replace files in the descendants of the destination directory as well as in the directory itself (not valid if the /A switch is used).
/U Replace those files that are older than the files being copied (not valid if the /A switch is used).
/W Pause before starting.

NOTE

You can't use REPLACE to transfer system files such as IO.SYS and MSDOS.SYS, nor can you use it to copy hidden files without first stripping the attributes with ATTRIB.

VERIFY Enable/disable write verification **INTERNAL**

SYNTAX

VERIFY [ON|OFF]

ON Enable write verification.
OFF Disable write verification.

NOTE

With write verification enabled, DOS verifies that what it writes to disk is correct by reading it back and comparing it with the image of the data still in memory. **Warning:** It does not, as is often supposed, perform a physical disk-to-disk comparison.

XCOPY Copy a file or files **EXTERNAL**

SYNTAX

XCOPY source [destination] [/A] [/D:date] [/E] [/M] [/P] [/S] [/V] [/W]

source Name of the file or files to copy.
destination Destination to copy the files to.
/A Copy the files whose archive bits are set and leave the archive bits intact.
/D:date Copy files modified on or after the specified date.
/E Copy empty subdirectories.
/M Copy the files whose archive bits are set, and clear the archive bits.
/P Prompt for confirmation before creating a file at the destination.
/S Copy the contents of the specified directory and its descendant directories.
/V Verify that the data was copied correctly.
/W Pause for a key press before beginning the copy operation.

NOTE

Use XCOPY rather than COPY if the file you are copying is larger than 64K, or you're copying two or more files. You can also use XCOPY to copy groups of files that are too large to fit onto a single floppy (by setting the archive bits with ATTRIB and using XCOPY's /M switch) and to back up entire branches of a hard disk directory tree (with the /S and /E switches).

MANAGING DISKS

ASSIGN Potentially too dangerous, retired **INTERNAL**

CD (CHDIR) Change directory, or display the current directory **INTERNAL**

SYNTAX

CD [d:][path]



New



Updated



Utility



Warning



RIP

path Name of the directory to change to.

NOTE

To move up one directory level, type

CD..

CHKDSK Check disk for file system errors or check files for fragmentation **EXTERNAL**

SYNTAX

CHKDSK [[d:][path]filename] [/F] [/V]

filename Name of the file or files to check for fragmentation.
 /F Fix errors discovered on the disk.
 /V Display filenames as the disk is checked.

NOTE

Run regularly, CHKDSK helps identify and repair disk errors before they grow to unmanageable proportions. Note that it will not *repair* the errors it finds unless you invoke it with a /F (for *fix*) switch.



DEFRAG Defragment disk **EXTERNAL**

SYNTAX

DEFRAG [d:] /F /S:order /U /V /B /SKIPHIGH /LCD /BW /G0 /A /H

d: Drive to be defragmented.
 /F Defragment so that no empty disk space remains between files.
 /S:order Sort files within directories using specified sort order. Valid values for *order* are
 N Sort by name (alphabetical order).
 -N Sort by name (reverse alphabetical order).
 E Sort by extension (alphabetical order).
 -E Sort by extension (reverse alphabetical order).
 D Sort by date (oldest to newest).
 -D Sort by date (newest to oldest).
 S Sort by size (smallest to largest).
 -S Sort by size (largest to smallest).
 /U Perform a partial optimization, reordering the clusters in individual files so that they are contiguous but leaving space between files.
 /V Verify that data is written to disk correctly.
 /B Reboot system after DEFRAG has completed.
 /SKIPHIGH Force DEFRAG to load only into conventional memory rather than high memory area for compatibility with some applications.
 /LCD Start DEFRAG in LCD mode.
 /BW Start DEFRAG in black-and-white mode.
 /G0 Start DEFRAG and disable graphics mouse and character set.
 /A Run DEFRAG in automatic mode.
 /H Move hidden files.

NOTE

Save time defragmenting your disks. Using the syntax

DEFRAG [d:] /U /B

instructs DEFRAG to defragment the specified drive, leaving any empty space between files that may already exist (/U), and then reboots your computer after the DEFRAG process is complete (/B).

DEFRAG should not be called from within Windows or used on network drives or drives connected with INTERLNK.

DISKCOMP Compare floppy disks **EXTERNAL**

SYNTAX

DISKCOMP [d1: [d2:]] [/1] [/8]

d1: Letter of the first drive.
 d2: Letter of the second drive.
 /1 Compare only the first sides of the disks.
 /8 Compare only eight sectors per track.

NOTE

The /1 and /8 switches are provided for backward compatibility with 160K, 180K, and 320K disks. DOS 6.0's FC command provides essentially the same functionality as DISKCOMP. However, DISKCOMP is provided on the DOS 6.0 supplemental program disk, and is listed here, for backward compatibility.

DISKCOPY Copy disk **EXTERNAL****SYNTAX**

DISKCOPY [d1: [d2:]] [/1] [/V]

d1: Letter of the drive to copy from.
 d2: Letter of the drive to copy to.
 /1 Copy only the first side of the disk.
 /V Verify that the data was copied correctly.

NOTE

DISKCOPY does not work between dissimilar disk types. To copy everything from one disk to another regardless of disk type, use the XCOPY command, as in

XCOPY A: B: /S /E

Also note that XCOPY does not copy hidden or system files.

JOIN Potentially too dangerous, retired **MD (MKDIR)** Make directory **INTERNAL****SYNTAX**

MD [d:]path

path Name of the directory to create.

NOTE

When you create a directory with the MD command, you are not automatically changed to the new directory. But with DOS 6.0's DOSKEY utility, you can create a command called MCD to create *and* change to a directory by typing

DOSKEY MCD=MD \$1 \$T CD \$1

RD (RMDIR) Remove directory **INTERNAL****SYNTAX**

RD [d:]path

path Name of the directory to remove.

NOTE

If RD insists that a subdirectory is not empty but the DIR command shows no files or subdirectories, the subdirectory may contain hidden or system files. To check, type

DIR /A

to display the hidden and system files in the current directory. Then use the ATTRIB command to strip the attributes so that you can delete the files and remove the directory.

SUBST Substitute drive for directory **EXTERNAL****SYNTAX**

SUBST [d1: [d2:]path] [/D]

d1: New drive letter.
 d2:path Drive and directory to associate d1: with.
 /D Delete a drive substitution.

NOTE

The SUBST command is useful when you run old applications that don't recognize subdirectories. It's also useful for circumventing the 127-character limit DOS places on PATH strings by establishing 2-character drive aliases for longer subdirectory names. You can't use a drive letter higher than *E* unless you include a LASTDRIVE command in your CONFIG.SYS file.

Once you've used a SUBST command on a drive, the following DOS commands will not work properly: CHKDSK, DEFRAG, DISKCOPY, FDISK, FORMAT, LABEL, RESTORE, and SYS.

Finally, you can simulate the function of the ASSIGN A=B command with SUBST by typing at the DOS command line:

SUBST A: B:\

TREE Display directory tree **EXTERNAL****SYNTAX**

TREE [d:]path [/A] [/F]

path Name of the subdirectory where TREE should begin.

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Utility



Warning



RIP

/A Use characters from the lower half of the IBM character set to draw lines.
/F Display filenames as well as subdirectory names.

NOTE

You can use an output redirection operator to direct the output from TREE to a printer. To send it to LPT1, type

```
TREE \ > LPT1
```

Or if the line-draw characters connecting subdirectory names on the screen aren't reproduced properly on your printer, type

```
TREE \ /A > LPT1
```

WORKING WITH DOS**APPEND** Set search path for nonexecutable files**EXTERNAL****SYNTAX**

```
APPEND [[d:]path;[d:]path;...] [/X[:ON|OFF]] [/PATH[:ON|OFF]] [/E]
```

path Directory name.
/X Specifies whether APPEND should be extended to work with DOS's Find First, Find Next, and EXEC functions.
/PATH Specifies whether APPEND should intervene when a pathname is supplied for a data file.
/E Stores the APPEND path as an environment variable.

NOTE

APPEND can be a dangerous command to use, and it achieves nothing that proper disk organization and work habits cannot. If you use it to open a data file in a remote directory and then save the file after making changes to it, it may be saved in the current directory. If you're unaware that has happened, it may appear that the file wasn't saved when you call it up again.

CLS Clear the screen**INTERNAL****SYNTAX**

```
CLS
```

NOTE

By itself, CLS is a rather unexciting command because it offers no options for setting the screen colors. However, if you install the ANSI.SYS driver and send color commands to it, CLS will clear the screen to the colors you selected. With ANSI.SYS installed, the command PROMPT \$(L;37;44m displays bright white text on a blue background. After issuing the command, you'll have to reset your DOS prompt with another PROMPT command.

**COMMAND** Start command processor**EXTERNAL****SYNTAX**

```
COMMAND [comspec] [device] [/C command] [/E:size] [/MSG] [/P] [/K]
```

comspec Location of COMMAND.COM on disk.
device Name of the device used for command input and output (default=CON).
/C command Execute a command and immediately terminate.
/E:size Number of bytes to allocate for the environment (default=160, range=160 to 32,768).
/MSG Store error messages in memory rather than on disk.
/P Install this copy of COMMAND.COM permanently in memory.
/K Execute a command, but do not terminate second copy of COMMAND.COM after the command has executed.

NOTE

DOS 6.0 is more graceful in handling missing COMMAND.COM file specifications than previous versions. When DOS fails to find the command interpreter, it will warn:

```
Bad or missing Command Interpreter
Enter correct name of Command Interpreter (e.g., C:\COMMAND.COM)
```

This will allow you to type in the drive and path to a valid or second copy of COMMAND.COM—or a renamed command interpreter—and allow your system to complete its booting process.

**DOSKEY** Install command-line enhancer and macro recorder**EXTERNAL****SYNTAX**

```
DOSKEY [/REINSTALL] [/BUFSIZE=size] [/MACROS] [/HISTORY]
```

[/INSERT|/OVERSTRIKE] [*macro*=*text*]

| | |
|-----------------------|--|
| /REINSTALL | Install a new copy of DOSKEY. |
| /BUFSIZE= <i>size</i> | Set buffer size to <i>size</i> in bytes (default=512). |
| /MACROS | Display all currently defined macros. |
| /HISTORY | Display command history. |
| /INSERT | Default to insert mode when editing commands. |
| /OVERSTRIKE | Default to overstrike mode when editing commands. |
| <i>macro</i> | Macro name. |
| <i>text</i> | Macro definition. |

DOSKEY understands the following special metacharacters in macro definitions:

| | |
|-----------------|--|
| \$B | Piping operator (). |
| \$G | Output redirection operator (>). |
| \$G\$G | Output redirection append operator (>>). |
| \$L | Input redirection operator (<). |
| \$T | Command separator, Ctrl-T (). |
| \$S | Dollar sign. |
| \$1 through \$9 | Replaceable parameters 1 through 9. |
| \$* | All command-line parameters. |

NOTE

Among other things, you can use DOSKEY to create new DOS commands. To illustrate, type

```
DOSKEY WHEREIS=DIR \$_1 /S /B
```

Then, type

```
WHEREIS *.BAK
```

to list all the files with the extension .BAK on the current drive. Macros take precedence over internal and external DOS commands, so you can even replace or modify commands such as DEL and CLS.

DOSSHELL Start the DOS Shell **EXTERNAL**

SYNTAX

```
DOSSHELL [/G[:res[n]]|/T[:res[n]]] /B
```

| | |
|------------|--|
| /G | Start the Shell in graphics mode. |
| <i>res</i> | Screen resolution. Valid values are |
| L | Low. |
| M | Medium. |
| H | High. |
| <i>n</i> | Resolution number (valid values depend on the type of video adapter being used). |
| /T | Start the Shell in text mode. |
| /B | Start the Shell in black-and-white mode. |

NOTE

You can do some things from the Shell that you cannot do from the command line. For example, the Shell's Rename function (found under the File menu) will rename a subdirectory. Also, DOS 6.0 supports task switching only through the Shell.

EXPAND Expand file or files **EXTERNAL**

SYNTAX

```
EXPAND [d:][path]filename1 [...] [d:][path][filename2]
```

| | |
|------------------|-----------------------------|
| <i>filename1</i> | Name of the file to expand. |
| <i>filename2</i> | Name of the expanded file. |

NOTE

The files on your DOS disks are shipped in compressed form to save space and reduce the number of disks. Usually, the installation program expands them for you. However, should you ever need to expand one manually (if, for example, you delete a file from your hard disk to conserve space and then discover later that you need it), EXPAND allows you to do so without having to reinstall DOS from the ground up.

FASTHELP Quick command syntax help **EXTERNAL**

SYNTAX

```
FASTHELP [command] or command /?
```

| | |
|----------------|---|
| <i>command</i> | Specific command you want information about. If none is specified, a list and brief description |
|----------------|---|



New



Updated



Utility



Warning



RIP

`command /?` of all DOS 6.0 commands will be displayed.
Quick help for a specific command.

NOTE

FASTHELP replaces DOS 5.0's DOSHELP utility.



HELP Display help for a DOS command or list all DOS commands **EXTERNAL**

SYNTAX

`HELP [command] /B /G /H /NOHI`

| | |
|----------------------|---|
| <code>command</code> | Name of the command you want help with. |
| <code>/B</code> | Run HELP in black-and-white mode. |
| <code>/G</code> | Run HELP in CGA mode. |
| <code>/H</code> | Run HELP with maximum number of lines the current display is configured to use. |
| <code>/NOHI</code> | Disable high-intensity display. |

To view an alphabetical index of all the DOS 6.0 commands, type

`HELP`

If you only want help with a single command, typing `[command] /?` is slightly faster than using `HELP`.

NOTE

Typing the full command name followed by the `/?` switch (for example, `EXPAND.EXE /?`) may bring additional help not given when you type the shortened command name with `/?` (for example, `EXPAND /?`).



MSD Microsoft System Diagnostics **EXTERNAL**

SYNTAX

`MSD /I /B /F[d:][path]filename1 /Pfilename2 /Sfilename3`

| | |
|--------------------------|---|
| <code>/I</code> | Force MSD to ignore installed hardware. |
| <code>/B</code> | Run in black-and-white mode. |
| <code>d:path</code> | Drive and path where reports are to be stored. |
| <code>/Pfilename1</code> | Prompt for user information and write to specified file. |
| <code>/Pfilename2</code> | Write complete report to specified file without program prompts. |
| <code>/Sfilename3</code> | Write summary report to specified file without program prompts. If no filename is specified, report is typed to the screen. |

NOTE

MSD can be run directly from the DOS command line without any parameters. If you can't load MSD, use the `/I` switch.

PATH Set search path for executable files **INTERNAL**

SYNTAX

`PATH [[d:]path[:[d:]path][;...]]`

NOTE

The default path is `C:\DOS` or `C:\MSDOS`, depending on which directory DOS is stored in, whether or not Clean Boot (F5) is used, or whether or not Interactive Boot (F8) is used and you choose not to process your `AUTOEXEC.BAT` file. To exceed the 127-character PATH limit, replace the PATH statement with a SET PATH statement. Use the same syntax.

PROMPT Configure command prompt **INTERNAL**

SYNTAX

`PROMPT [promptstring]`

| | |
|---------------------------|---|
| <code>promptstring</code> | String that defines the appearance of the prompt. |
|---------------------------|---|

The PROMPT command understands the following special metacharacters in prompt definitions:

| | |
|------------------|--|
| <code>\$B</code> | Piping operator (<code>()</code>). |
| <code>\$D</code> | Current date. |
| <code>\$E</code> | Escape character. |
| <code>\$G</code> | Output redirection operator (<code>></code>). |
| <code>\$H</code> | Backspace (delete previous character). |
| <code>\$L</code> | Input redirection operator (<code><</code>). |
| <code>\$N</code> | Current drive. |
| <code>\$P</code> | Current drive and directory. |
| <code>\$Q</code> | Equal sign (<code>=</code>). |

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RIP

| | |
|-----|---------------------|
| \$T | Current time. |
| \$V | DOS version number. |
| \$S | Dollar sign. |
| \$_ | Carriage return. |

NOTE

The default prompt is \$P\$G when no path is specified in AUTOEXEC.BAT.

SET Set environment variable

INTERNAL

**SYNTAX**

SET [variable=[string]]

| | |
|----------|---|
| variable | Name of an environment variable. |
| string | String to equate the environment variable with. |

NOTE

SET commands can now be established in CONFIG.SYS.

If running the SET command produces the error message "Out of environment space," you can increase the size of the environment by placing a SHELL statement in CONFIG.SYS. See COMMAND for instructions.

SETVER Modify DOS version table

EXTERNAL

SYNTAX

SETVER [d:path] [filename] [n.nn] [/DELETE] [/QUIET]

| | |
|----------|--|
| d:path | Drive and directory where SETVER.EXE is stored. |
| filename | Filename of the application program to report a different version number to. |
| n.nn | Version number to report to application program (for example, 4.00). |
| /DELETE | Remove an entry from the version table. |
| /QUIET | Suppress messages when /DELETE is used. |

NOTE

SETVER is effective only if SETVER.EXE is loaded with a DEVICE or DEVICEHIGH statement in CONFIG.SYS. After you add or delete entries from the version table, the system must be restarted for the changes to take effect.

VER Display DOS version

INTERNAL

SYNTAX

VER

NOTE

Typing VER /R will provide a more detailed report of the current DOS version than typing VER /?

Some programs and utilities check the version of DOS they're running under and refuse to run under DOS 6.0. You can use the SETVER command to alter the version number that DOS reports to individual programs so they will run.

DISASTER PREVENTION

BACKUP Replaced by MSBACKUP



MIRROR Back up hard disk partition tables, create mirror file, or install delete-tracking option

**SYNTAX**

To create a backup copy of a hard disk's partition tables:

MIRROR /PARTN

To create a mirror file for use by the UNFORMAT command:

MIRROR d: [/1]

To make MIRROR memory resident and have it perform delete-tracking for the UNDELETE command:

MIRROR /Tdrive[-entries][...]

To remove MIRROR from memory:

MIRROR /U

| | |
|--------|--|
| /PARTN | Create a backup copy of the partition tables. |
| /1 | Retain only the latest information about a disk. |



New



Updated



Utility



Warning



RIP

/T:drive

Perform delete-tracking for the specified drive entries. Number of entries in the delete-tracking file for the corresponding drive (range=1 to 999).

NOTE

The MIRROR command was pulled from DOS 6.0 at the last minute. It is available from Microsoft on a supplemental disk, or you can copy MIRROR.COM from your DOS 5.0 directory. Be sure to rename UNFORMAT.COM as UNMIRROR.COM because DOS 6.0 already has UNFORMAT.COM, which cannot restore a mirrored partition. MIRROR creates a backup copy of a hard disk's partition tables, creates a mirror file that the UNFORMAT command can use to recover data on a formatted disk, and performs delete-tracking, which helps the UNDELETE command restore difficult files. Some features of MIRROR are built into DOS 6.0's UNDELETE and UNFORMAT utilities, including the Windows version of UNDELETE and MWUNDEL.



MSAV/MWAV Microsoft Anti-Virus **EXTERNAL**

SYNTAX

MSAV [d:][path] /S /C /R /A /L /N /P /F

/VIDEO /ss /IN /BW /MONO /LCD /FF /BF /NF /BT /NGM /LE /PS2

| | |
|--------------------|--|
| [d:] [path] | Drive and directory where MSAV is stored. |
| /S | Scan specified drives for virus infection. |
| /C | Scan for and remove virus infection. |
| /R | Create a report detailing scanning activity (default=off). |
| /A | Scan all physical drives except floppy drives. |
| /L | Disable scanning of network drives. |
| /N | Run in command mode rather than graphical mode. |
| /P | Run in command mode with command-line switches. |
| /F | Disable filename display while scanning is in process. |
| /VIDEO | Display valid video-switch parameters available. |
| /ss | Set screen size (depends on capability of monitor). Valid settings include |
| /25 | Set 25 lines per screen (default). |
| /28 | Set 28 lines per screen (VGA only). |
| /43 | Set 43 lines per screen (VGA and EGA only). |
| /50 | Set 50 lines per screen (VGA only). |
| /60 | Set 60 lines per screen (VGA and Video 7 adapters only). |
| /IN | Run MSAV with a predefined color scheme. |
| /BW | Run MSAV in black-and-white mode. |
| /MONO | Run MSAV in monochrome mode. |
| /LCD | Run MSAV in LCD mode. |
| /FF | Run MSAV in fast screen mode. |
| /BF | Use BIOS calls rather than software calls to display screen activity. |
| /NF | Disable monitor's alternate screen font sets. |
| /BT | Enable use of mouse with MSAV in Windows. |
| /NGM | Disable mouse character display. |
| /LE | Swap left and right mouse buttons. |
| /PS2 | Reset mouse if cursor disappears. |

NOTE

MSAV is technically Central Point's Anti-Virus program and functions nearly identically. To scan your C: drive each time you boot your computer, add the following line to your AUTOEXEC.BAT file:

MSAV C: /A /N /F

Using this syntax, MSAV will scan your C: drive but not your floppy drives, removing any viral infection it may find. Running in command mode instead of graphical mode, it will not display any filenames as it scans your files.

MWAV is the Windows version of Microsoft Anti-Virus. If during DOS 6.0 setup you selected to install for both DOS and Windows, the MWAV files are automatically installed in your \DOS directory. A new group is created called WNTTOOLS.GRP, so you can easily select the Windows-based utilities and programs to run.



MSBACKUP/MWBACKUP Microsoft Backup and Restore **EXTERNAL**

SYNTAX

MSBACKUP setup_filename /BW /LCD /MDA

| | |
|-----------------------|--|
| setup_filename | Use predefined setup filename with MSBACKUP. |
| /BW | Run MSBACKUP in black-and-white mode. |
| /LCD | Run MSBACKUP in LCD mode. |
| /MDA | Run MSBACKUP in monochrome mode. |

NOTE

MSBACKUP is Microsoft's menu-driven replacement for DOS 5.0's BACKUP program. MSBACKUP does not support use of



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tape backup devices. MSBACKUP provides a menu-driven companion program, called MWRBACKUP, specifically for Windows environments. Backups and catalog files created in one environment of the program are compatible in the other environment.

RECOVER Potentially too dangerous, retired

RESTORE Restore files backed up with the BACKUP command **EXTERNAL**

SYNTAX

```
RESTORE d: [path[filename]] [/A:date] [/B:date] [/D] [/E:time]
[/L:time] [/M] [/N] [/P] [/S]
```

| | |
|-----------------|--|
| <i>filename</i> | Name of the file(s) to be restored. |
| <i>/A:date</i> | Restore files modified on or after date specified. |
| <i>/B:date</i> | Restore files modified on or before date specified. |
| <i>/D</i> | Display list of files without restoring any of them. |
| <i>/E:time</i> | Restore files modified at or earlier than time specified. |
| <i>/L:time</i> | Restore files modified at or later than time specified. |
| <i>/M</i> | Restore only those files modified since last backup. |
| <i>/N</i> | Restore only the files that do not exist on destination disk. |
| <i>/P</i> | Prompt for confirmation before restoring files with read-only or archive attributes set. |
| <i>/S</i> | Restore files from specified directory, along with all its descendants. |

NOTE

In DOS 5.0, RESTORE was modified so it could restore files backed up by any previous version of BACKUP. In DOS 6.0, RESTORE is provided so files backed up with BACKUP can be restored, but it can't restore files backed up with MSBACKUP.

SHARE Install file-sharing support **EXTERNAL**

SYNTAX

```
SHARE [/F:size] [/L:locks]
```

| | |
|-----------------|---|
| <i>/F:size</i> | Allocate size bytes for recording file-sharing information (default=2,048). |
| <i>/L:locks</i> | Maximum number of files that can be locked at one time (default=20). |

NOTE

SHARE installs the component of DOS that supports file sharing and locking in networked environments. In DOS 4.0, SHARE also included the module that prevented programs using file control blocks from inadvertently destroying data stored in large partitions. In Version 5.0, that module was moved to the DOS kernel, so SHARE is no longer required solely to support greater-than-32MB disk partitions.

UNDELETE/MWUNDEL .. Recover deleted files **EXTERNAL**

SYNTAX

```
UNDELETE [[d:] [path] filename] [/LIST|/ALL|/PURGE:drive|/STATUS|/LOAD|/U]
[/DOS|/DT|/DS] [/Sentry:drive] [/Tracker:drive-entries]
```

| | |
|-------------------------------|---|
| <i>filename</i> | Name of the file or files to undelete. |
| <i>/LIST</i> | List the files that may be recovered. |
| <i>/ALL</i> | Recover files without prompting for the first letter of each filename. |
| <i>/PURGE:drive</i> | Delete all files in sentry directory on specified drive. |
| <i>/STATUS</i> | Display current UNDELETE protection level enabled. |
| <i>/LOAD</i> | Load UNDELETE memory resident to track deleted files. |
| <i>/U</i> | Unload resident portion of UNDELETE delete tracker. |
| <i>/DOS</i> | Ignore the delete-tracking file. |
| <i>/DT</i> | Use the delete-tracking file. |
| <i>/DS</i> | Undelete only the files in the <i>/SENTRY</i> directory. |
| <i>/Sentry:drive</i> | Specify drive for Delete Sentry files. |
| <i>/Tracker:drive-entries</i> | Specify drive to track deleted files on, with optional maximum number of deleted files to track, from 1 to 999. |

NOTE

Some of the MIRROR commands from DOS 5.0 have been incorporated into DOS 6.0's UNDELETE utility. See also MIRROR.

If you want to undelete several files without having to supply the first letter of each one, go to the directory where the files were stored and type

```
UNDELETE /ALL
```

DOS will supply the missing first letters for you, which you can later change with the REN command. Note that the sooner UNDELETE is run after a file is deleted, the greater the chance that the file can be recovered.

MWUNDEL is the Windows version of UNDELETE.



New



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Utility



Warning



RIP

**UNFORMAT** Unformat a disk or disk partition, or display partition information **EXTERNAL****SYNTAX**

UNFORMAT [d:] /L /TEST /P

| | |
|-------|--|
| /L | List every file and subdirectory found by UNFORMAT. |
| /TEST | Perform a test unformat without actually restoring any data. |
| /P | Send output messages to LPT1. |

NOTE

Applied to a disk that was just formatted with the DOS 6.0 FORMAT command, UNFORMAT will recover 100 percent of the data in its original form. You can use UNFORMAT to display hard disk partition information by typing

UNFORMAT /L

**VSAFE** Virus safety utility **EXTERNAL****SYNTAX**

VSAFE [/option #+|#-] /NE /NX /An /Cn /N /D /U

| | |
|---------------|---|
| /option #+ #- | Enable or disable specific options. Valid values are |
| 1 | Warn when a request to format is received. |
| 2 | Warn if a program tries to stay memory resident. |
| 3 | Disable all disk writes. |
| 4 | Validate all files DOS opens. |
| 5 | Scan all disks on all drives for boot sector viruses. |
| 6 | Warn when a program attempts to write to boot sector or partition table of hard disk drive. |
| 7 | Warn when a program attempts to write to boot sector of floppy disk. |
| 8 | Warn when a program attempts to change an executable file. |
| /NE | Disable loading into expanded memory. |
| /NX | Disable loading into extended memory. |
| /An | Enable specified Alt-letter hotkey (for example, Alt-V). |
| /Cn | Enable specified Ctrl-letter hotkey (for example, Ctrl-V). |
| /N | Enable network drive monitoring. |
| /D | Disable CRC checking. |
| /U | Unload VSAFE from memory (must be last program loaded). |

NOTE

VSAFE is compatible with Windows 3.1 as long as the memory-resident message utility for VSAFE is set up on the LOAD= line in your WIN.INI file. Be sure the following setting is enabled:

load=MMAVTSR.EXE

BATCH COMMANDS**CALL** Call one batch program from another batch program **INTERNAL****SYNTAX**

CALL [d:][path]filename [parameters]

| | |
|------------|--|
| filename | Name of the batch program to call. |
| parameters | Parameters passed to the called batch program. |

NOTE

If you start one batch file from another without using the CALL command, control does not return to the calling program when the called program terminates. The CALL command ensures that control does return.

**CHOICE** Display prompts and pause for choice **INTERNAL****SYNTAX**

CHOICE /C: keystrokes /N /S /T:a,ss text

| | |
|------------|---|
| /C | Define keystrokes acceptable as valid choices. The default is [yn] if no choices are specified. Multiple characters are accepted. |
| keystrokes | Define keystrokes accepted as a response to a CHOICE prompt. Multiple characters are accepted. |
| /N | Prevent display of prompts. |
| /S | Specify if CHOICE prompt is case sensitive. |

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Circle 114 on reader service card.

/T:a,ss

Allow a pause after a CHOICE parameter is issued; *a* specifies the alphabetic character to choose if no keys are pressed; *ss* specifies the number of seconds to pause before selecting the default. If 0 is specified, no pause will be allowed. Specific text to display for a CHOICE command.

text

NOTE

Two additional ERRORLEVELS are returned: ERRORLEVEL 0 is returned if either Ctrl-C or Ctrl-Break is pressed, and ERRORLEVEL 255 is returned if an error occurs.

ECHO Enable/disable echo or display a message **INTERNAL**

SYNTAX

ECHO [ON|OFF] [message]

| | |
|----------------|--------------------------|
| ON | Enable command echoing. |
| OFF | Disable command echoing. |
| message | Message text. |

NOTE

In DOS 6.0, you can output a blank line from a batch file with the command

ECHO

EXIT Terminate command processor **INTERNAL**

SYNTAX

EXIT

NOTE

COMMAND.COM ignores the EXIT command if it was started with a /P switch.

If you install COMMAND.COM with a SHELL= directive in CONFIG.SYS and forget to include the /P switch, you can crash the system by typing EXIT on the command line.

FOR Execute command once for each element of a set **INTERNAL**

SYNTAX

FOR %%variable IN (set) DO command

| | |
|-----------------|---|
| variable | Variable name (A through Z). |
| set | List of filenames or text strings to be substituted for %%variable. |
| command | Command to execute. |

NOTE

If you run FOR from the command line or use it in a DOSKEY command macro, include only a single percent sign in front of the variable. To create a super TYPE command (one that will accept wildcard characters in filenames) use the command

DOSKEY TYPE=FOR %F IN (*) DO TYPE %F

GOTO Jump to another line in a batch file **INTERNAL**

SYNTAX

GOTO label

label Name of the line to jump to.

NOTE

You can substitute the name of an environment variable enclosed in percent signs for the label parameter, and GOTO will jump to the label name that the environment variable is set equal to. You can use this little-known technique to call batch subroutines, as illustrated by this example batch file:

```
SET RETURN=LABEL1
GOTO SUBROUTINE
:LABEL1
.
.
.
:SUBROUTINE
ECHO Hello, world!
GOTO %RETURN%
```



IF Execute command conditionally **INTERNAL**

SYNTAX

To test an exit code returned by a program:

IF [NOT] *ERRORLEVEL* *exitcode* *command*

To compare two strings:

IF [NOT] *string1*==*string2* *command*

To see if a file exists in a specified location on disk:

IF [NOT] **EXIST** [*d:*][*path*]*filename* *command*

| | |
|-----------------|--|
| <i>exitcode</i> | Exit code value (0 to 255). |
| <i>command</i> | Command to execute if the test returns true. |
| <i>string1</i> | Text string. |
| <i>string2</i> | Text string. |

NOTE

It's a good idea to use quotation marks when performing string comparisons with the **IF** command so that the batch file won't crash if a comparison is performed on a null parameter. You can test for a null parameter with the following statement:

IF "%1"==" " *command*

PAUSE Pause batch file execution **INTERNAL**

SYNTAX

PAUSE

NOTE

Pressing Ctrl-C or Ctrl-Break while **PAUSE** is waiting for a keystroke will terminate a batch file. Thus, you can use **PAUSE** to allow a batch file to be terminated at specified points.



REM (or ;) Remark **INTERNAL**

SYNTAX

REM [*comment*] **or** ; [*comment*]

| | |
|----------------|-----------------|
| <i>comment</i> | Comment string. |
|----------------|-----------------|

NOTE

REM can be used in **CONFIG.SYS** as well as in batch files. If you use the Multi-config option for **CONFIG.SYS** to support multiple boot configurations, use **REM** to place a header at the top of each one to describe which configuration it corresponds to.

The ; remark capability applies to **WIN.INI** files.

SHIFT Shift replaceable parameters one position left **INTERNAL**

SYNTAX

SHIFT

NOTE

In addition to allowing a batch file to access more than nine command-line parameters, the **SHIFT** command is useful for writing batch files capable of handling an unknown number of command-line parameters. For example, this batch file (call it **MDL.BAT**) works just like the **DEL** command except that it accepts multiple filenames:

```
:START
IF "%1"==" " GOTO END
DEL %1 /P
SHIFT
GOTO START
:END
```

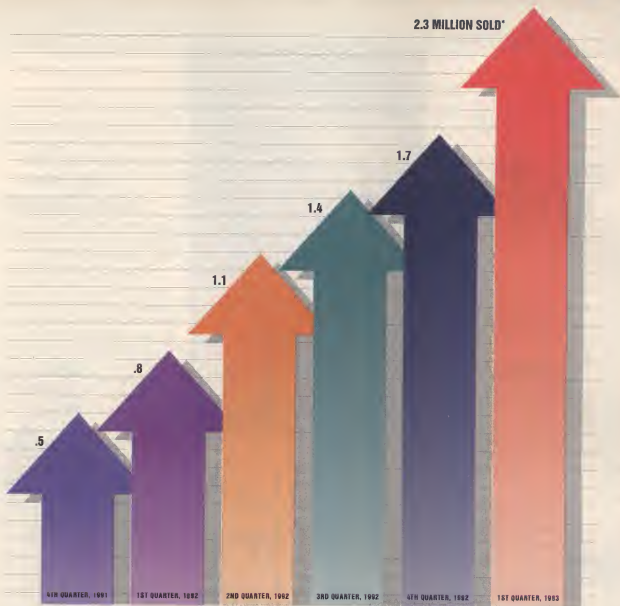
WORKING WITH TEXT

EDIT Edit text (start full-screen text editor) **EXTERNAL**

SYNTAX

EDIT [[*d:*][*path*]*filename*] [/B] [/G] [/H] [/NOHI]

2.3 MILLION SOLD*



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| | |
|-----------------|--|
| <i>filename</i> | Name of the file to edit. |
| <i>/B</i> | Start the Editor in black-and-white mode. |
| <i>/G</i> | Perform fast updates on CGA monitors. |
| <i>/H</i> | Display the maximum number of lines possible. |
| <i>/NOHI</i> | Suppress the display of high-intensity colors. |

NOTE

To start the Editor, EDIT.COM invokes QBASIC.EXE with a /EDITOR switch. EDIT will not run unless QBASIC.EXE is in the current directory, the current path, or the directory in which EDIT.COM is stored.

EDLIN Replaced by EDIT

FIND Find character string **EXTERNAL**

SYNTAX

FIND [/C] [/I] [/N] [/V] "string" [d:][path]filename

or

FIND [/C] [/I] [/N] [/V] "string" < source

or

command | FIND [/C] [/I] [/N] [/V] "string"

| | |
|-----------------|--|
| <i>/C</i> | Display find count. |
| <i>/I</i> | Ignore case. |
| <i>/N</i> | Display line numbers. |
| <i>/V</i> | Display lines that do <i>not</i> contain the string. |
| <i>string</i> | Text string to search for. |
| <i>filename</i> | Name of the file to search. |
| <i>source</i> | File or device providing the input. |
| <i>command</i> | Command providing the input. |

NOTE

FIND is the only one of the three filter commands that DOS provides (the other two are MORE and SORT) that can act on its own—without having input supplied to it by an input redirection or piping operator.

In batch files, DOS returns ERRORLEVEL 0 if a specified string has been found, ERRORLEVEL 1 if the string has not been found, and ERRORLEVEL 2 if an error occurred during the operation. Both Ctrl-C and Ctrl-Break return ERRORLEVEL 0.

MORE Display information one screen at a time **EXTERNAL**

SYNTAX

MORE < source

or

command | MORE

| | |
|----------------|-------------------------------------|
| <i>source</i> | File or device providing the input. |
| <i>command</i> | Command providing the input. |

NOTE

If a text file fills more than one screen, use the command

MORE < *filename*

to view it rather than the TYPE command.

SORT Sort text **EXTERNAL**

SYNTAX

SORT [/R] [/+nn] < source [> destination]

or

command | SORT [/R] [/+nn] [> destination]

| | |
|--------------------|-------------------------------------|
| <i>/R</i> | Sort in reverse order. |
| <i>/+nn</i> | Sort on column number <i>nn</i> . |
| <i>source</i> | File or device providing the input. |
| <i>destination</i> | File or device to direct output to. |
| <i>command</i> | Command providing the input. |



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Warning



RIP

NOTE

In previous versions of DOS, SORT was frequently used to sort the output from the DIR command. However, the DIR command's /O switch now makes that unnecessary.

TYPE List the contents of a text file to the screen **INTERNAL**

SYNTAX

TYPE [d:][path]filename

filename Name of the file to display.

NOTE

If the listing is more than one screen long, you can display it one page at a time by piping output from TYPE to the MORE command, as in

TYPE EXPENSES.TXT | MORE

CONFIGURING DISKS

DBLSPACE Data-compression utility **EXTERNAL**

SYNTAX

DBLSPACE /AUTOMOUNT /CHKDSK /COMPRESS /CONVSTAC /CREATE /DEFRAGMENT

/DELETE /FORMAT /INFO /LIST /MOUNT /MOVE /RATIO /SIZE /UNMOUNT

| | |
|-------------|---|
| /AUTOMOUNT | Automatically mount a specific compressed disk. |
| /CHKDSK | Check directory and FAT of disk and reports status of compressed drive. |
| /COMPRESS | Begin compressing a hard disk drive or floppy disk. |
| /CONVSTAC | Convert an existing Stacker compressed volume to a DBLSPACE volume. |
| /CREATE | Create new compressed volume using free space available. |
| /DEFRAGMENT | Defragment files on a compressed volume. |
| /DELETE | Remove a compressed drive. |
| /FORMAT | Prepare a compressed volume. |
| /INFO | Show detailed information about a compressed volume. |
| /LIST | List all compressed and uncompressed drives installed. |
| /MOUNT | Mount a compressed volume. |
| /MOVE | Load DBLSPACE.SYS with Quarterdeck's QEMM LOADHI program. |
| /RATIO | Show compressed file ratio on a compressed volume. |
| /SIZE | Adjust size of a compressed volume. |
| /UNMOUNT | Dismount a compressed volume. |

NOTE

DBLSPACE.EXE must be run and compression performed on a disk drive before the DBLSPACE.SYS device driver can be used. Once compression has been performed, DOS will automatically update CONFIG.SYS to include the driver.

The default cluster size for DBLSPACE compressed volumes is 8K. The maximum size of a DBLSPACE volume is 512MB.

FASTOPEN Install filename cache for speedier disk access **EXTERNAL**

SYNTAX

FASTOPEN d: [[=]n] [...] [/X]

n Number of files to cache information for (default=48, range=10 to 999).
/X Allocate buffer space in expanded memory.

NOTE

FASTOPEN is an easy and inexpensive way to speed up the operation of your hard disk. As a rule of thumb, allocate one FASTOPEN buffer for every megabyte of space on the hard disk partition it's being used on. To speed disk operations even further, use FASTOPEN and SmartDrive together.



FDISK Configure hard disk partition tables **EXTERNAL**

SYNTAX

FDISK /STATUS

/STATUS Display partition table information for installed hard disk drives.

NOTE

If you want to repartition an old hard disk to take advantage of large partitions, you'll have to use FDISK to delete the old partitions first. Note that doing so will destroy all the files on the disk, so you'll have to back them up first.

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FORMAT Format hard disk partition or floppy disk **EXTERNAL****SYNTAX**

FORMAT *d*: [/1] [/4] [/8] [/B] [/T:*tracks*] [/N:*sectors*] [/F:*size*]
 [/Q] [/S] [/U] [/V: *label*]: /AUTOTEST

/1 Format one side of the disk only.
 /4 Format a 360K disk in a 1.2MB drive.
 /8 Format eight sectors per track.
 /B Reserve room on the disk for system files.
 /T:*tracks* Number of tracks on the disk.
 /N:*sectors* Number of sectors per track.
 /F:*size* Capacity to format a floppy to. Valid values for size are

| DISK | SIZE |
|--------|--|
| 160K | 160, 160K, or 160KB. |
| 180K | 180, 180K, or 180KB. |
| 320K | 320, 320K, or 320KB. |
| 360K | 360, 360K, or 360KB. |
| 720K | 720, 720K, or 720KB. |
| 1.2MB | 1200, 1200K, 1200KB, 1.2, 1.2M, or 1.2MB. |
| 1.44MB | 1440, 1440K, 1440KB, 1.44, 1.44M, or 1.44MB. |
| 2.88MB | 2880, 2880K, 2880KB, 2.88, 2.88M, or 2.88MB. |

/Q Perform a quick format.
 /S Copy the system files after formatting.
 /U Perform an unconditional format.
 /V:*label* Add volume label.
 /AUTOTEST Bypass prompts while formatting (this switch is undocumented).

NOTE

FORMAT /S will also copy the hidden, system, and read-only file DBLSPACE.BIN to the destination disk, reducing the amount of free space available on the formatted disk. If you are not using DBLSPACE, you can change the attributes of the file with ATTRIB and then delete it.

You can erase all the files and subdirectories on a disk in seconds with the command

FORMAT *d*: /Q

Or, if you're more concerned with speed than with making sure the disk can be unformatted later, use

FORMAT *d*: /Q /U

Any disk not formatted with the /U switch can be unformatted with the UNFORMAT command.
 SYS will copy the DBLSPACE.BIN file if found.

LABEL Define, modify, or delete volume label **EXTERNAL****SYNTAX**

LABEL [*d*:][*label*]

label Volume label for the disk.

NOTE

DOS displays the volume label when you run the DIR, CHKDSK, TREE, or VOL commands. You may also specify a volume label while the disk is being formatted.

SYS Transfer system files to *d* disk **EXTERNAL****SYNTAX**

SYS [*d1*:][*path*] *d2*:

d1: Drive where the system files reside.
d2: Drive to copy the system files to.

NOTE

Transferring system files to a disk with SYS also adds the file DBLSPACE.BIN to the root directory of the disk. The file has the same attributes as IO.SYS and MSDOS.SYS. If you are not using DBLSPACE, you can change the attributes of this file and then delete it.

The SYS command copies COMMAND.COM as well as the system files IO.SYS and MSDOS.SYS. It will also work on any disk, not just one that is empty or that was formatted with a /B switch. If SYS displays the message "Could not copy COMMAND.COM onto target disk," use the SET command to point COMSPEC to the drive and directory where COMMAND.COM is stored.

FORMAT /S will copy the DBLSPACE.BIN file if found.



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Warning



RIP

VOL Display a logical volume's volume label and serial number **INTERNAL**

SYNTAX

VOL [d:]

NOTE

Volume labels can be changed with the LABEL command and may be specified when a disk is formatted. Serial numbers are applied during the formatting process.

CONFIGURING MEMORY

EMM386 Control 386 memory manager **EXTERNAL**

SYNTAX

EMM386 [ON|OFF|AUTO] [W=ON|OFF] ALTB00T [/?

| | |
|---------|--|
| ON | Enable the EMM386.EXE driver. |
| OFF | Disable the EMM386.EXE driver. |
| AUTO | Place the EMM386.EXE driver in AUTO mode. |
| W=ON | Enable Weitek coprocessor support. |
| W=OFF | Disable Weitek coprocessor support. |
| ALTB00T | Alternate boot sequence for compatibility with some computers. |
| /? | Access help for command-line switches. |

NOTE

If your PC fails to recognize Ctrl-Alt-Del, load EMM386.EXE from CONFIG.SYS with the parameter ALTB00T. Some programs are incompatible with EMM386.EXE. Before running such a program, use OFF or AUTO; You can't disable EMM386.EXE when it's providing expanded memory to an application or if there are TSRs or device drivers loaded high.

INSTALLHIGH Load TSRs into upper memory from CONFIG.SYS **INTERNAL**

SYNTAX

INSTALLHIGH[?] [d:][path]filename [parameters]

| | |
|------------|--|
| ? | Prompts you to skip or load program. |
| filename | Name of the program to load high. |
| parameters | Parameters passed to the program being loaded. |

LOADFIX Load program above the 64K mark **EXTERNAL**

SYNTAX

LOADFIX [d:][path]filename [parameters]

| | |
|------------|--|
| filename | Name of the program to run. |
| parameters | Parameters passed to the program being loaded. |

NOTE

Use LOADFIX if you receive a "Packed file corrupt" message when you try to run a program.



LOADHIGH (LH) Load a TSR in upper memory **INTERNAL**

SYNTAX

LOADHIGH [d:][path]filename [/L:region#] [parameters]

| | |
|------------|--|
| filename | Name of the program to load high. |
| /L:region# | Load device driver high into specific memory region. |
| parameters | Parameters passed to the program being loaded. |

NOTE

If there isn't enough upper memory remaining to load a TSR high, LOADHIGH will load it in conventional memory without telling you that it did so. To determine where a TSR was loaded, use the MEM/C command.



MEM Profile memory usage **EXTERNAL**

SYNTAX

MEM /CLASSIFY /DEBUG /FREE /MODULE name /PAGE

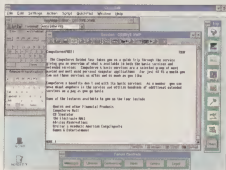
| | |
|-----------|--|
| /CLASSIFY | Display a list of programs loaded in conventional and upper memory. |
| /DEBUG | Display a list of programs and internal device drivers loaded in memory. |
| /FREE | Show free regions in upper memory blocks. |

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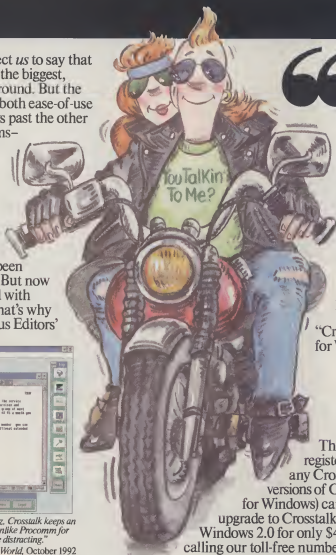
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"Crosstalk covers all bases with its sophisticated scripting for high-end users and quick on-line access for novices. This rich package is suitable for any environment..."
—PC Magazine Editors' Choice, April 1993

about their preference.

PC Magazine called our interface "elegantly designed" while noting that with Procomm Plus for Windows, "so many non-essential elements remain on-screen during terminal sessions." And Windows Sources commented that Crosstalk, "unlike Procomm for Windows, provides a full screen for sessions."

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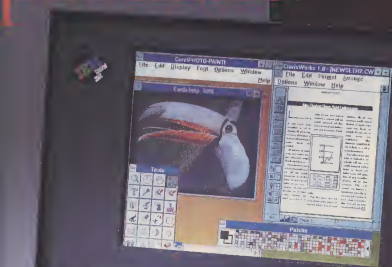
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June 30, 1992
FlexScan F550



ANNUAL
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FlexScan F550

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March 16, 1993
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/MODULE *name* Show information about a particular program (module) in memory.
/PAGE Page the output of a MEM command one screen at a time.

NOTE

The switches may be abbreviated */C*, */D*, */E*, */Mname*, and */P*.

SETTING UP HARDWARE

BREAK Enable/disable break checking **INTERNAL**

SYNTAX

BREAK [ON|OFF]

ON Enable break checking.
OFF Disable break checking.

NOTE

By default, DOS checks for Ctrl-C and Ctrl-Break keystrokes infrequently. Enabling break checking causes DOS to check the keyboard more often. BREAK can be used on the command line, from AUTOEXEC.BAT, or from CONFIG.SYS.

CHCP Change code page **INTERNAL**

SYNTAX

CHCP [*nnn*]

nnn Number of the code page to change to. Valid values are
 437 United States.
 850 Multilingual (Latin I).
 852 Slavic (Latin II).
 860 Portuguese.
 863 Canadian-French.
 865 Nordic.

NOTE

Before you can switch to a code page, you must execute NLSFUNC to install national-language support functions and prepare the code page with the MODE command. You can also change code pages with the MODE SELECT command.

CTTY Set console device **INTERNAL**

SYNTAX

CTTY *device*

device Name of the device to serve as the console device.

NOTE

You can use CTTY to suppress output from DOS commands in batch files. The command

CTTY NUL

directs all command output to the NUL device driver until a

CTTY CON

command is subsequently issued. Be careful: CTTY NUL directs DOS to the NUL driver for its input as well as its output, so if something goes wrong while NUL is the console device, you'll have to reboot your PC to regain control.

DATE Set system date **INTERNAL**

SYNTAX

DATE [*date*]

date Current date.

NOTE

With DOS Version 3.3, the DATE command gained the ability to set the CMOS calendar in a PC.

GRAFTABL No one really used this anymore **INTERNAL**

GRAPHICS Install a graphics-mode screen dump capability **EXTERNAL**

SYNTAX

GRAPHICS [*printer*] [[*d:*][*path*]*filename*] [/B] [/R] [/LCD] [/PB:*id*]



New



Updated



Utility



Warning



RIP

| | |
|------------------|--|
| <i>printer</i> | Type of printer that output will be going to. Valid values are |
| COLOR1 | IBM Color Printer with black ribbon. |
| COLOR4 | IBM Color Printer with RGB ribbon. |
| COLOR8 | IBM Color Printer with CMY ribbon. |
| DESKJET | Hewlett-Packard DeskJet printer. |
| GRAPHICS | IBM Graphics Printer, IBM ProPrinter, and most Epson printers. |
| GRAPHICSWIDE | IBM Graphics Printer and most Epson printers with wide carriages. |
| HPDEFAULT | Any Hewlett-Packard PCL printer. |
| LASERJET | Any Hewlett-Packard LaserJet printer. |
| LASERJETII | Hewlett-Packard LaserJet II printer. |
| PAINTJET | Hewlett-Packard PaintJet printer. |
| QUIETJET | Hewlett-Packard QuietJet printer. |
| QUIETJETPLUS | Hewlett-Packard QuietJet Plus printer. |
| RUGGEDWRITER | Hewlett-Packard RuggedWriter printer. |
| RUGGEDWRITERWIDE | Hewlett-Packard RuggedWriter printer with wide carriage. |
| THERMAL | IBM PC Convertible thermal printer. |
| THINKJET | Hewlett-Packard ThinkJet printer. |
| <i>filename</i> | Name of the printer profile file that contains the information GRAPHICS uses to characterize printers (normally GRAPHICS.PRO). |
| /B | Print the background in color on COLOR4 and COLOR8 printers. |
| /R | Print the image as it appears on the screen rather than reversed. |
| /LCD | Print an image from the LCD screen of the IBM PC Convertible. |
| /PB: <i>id</i> | Aspect ratio to be used. Valid values for <i>id</i> are |
| STD | Use standard aspect ratio. |
| LCD | LCD aspect ratio (same as /LCD). |

NOTE

GRAPHICS works with EGA and VGA display adapters as well as with LaserJet printers. If you own an Epson dot matrix printer, specify the GRAPHICS or GRAPHICSWIDE printer type.

KEYB Install alternate keyboard layout **EXTERNAL**

SYNTAX

KEYB [*xx*[,*yyy*][,*d*:[*path*]*filename*]] [/E] [/ID:*nnn*]

| | |
|-----------------|---|
| <i>xx</i> | Two-digit keyboard code. |
| <i>yyy</i> | Code page number. |
| <i>filename</i> | Name of the keyboard definition file (normally KEYBOARD.SYS). |
| /E | Keyboard is an enhanced keyboard. |
| /ID: <i>nnn</i> | Specifies which keyboard layout to use when there is more than one. |

NOTE

To return to the default keyboard layout press Ctrl-Alt-F1; to get back to the new one press Ctrl-Alt-F2. KEYB also provides a convenient mechanism for entering characters from foreign alphabets. For example, in some layouts, typing apostrophe-A produces the letter *a* with an acute accent.

MODE Configure device **EXTERNAL**

SYNTAX

To configure a printer attached to a parallel port:

MODE LPT*n*[:] [COLS=*columns*] [LINES=*lines*] [RETRY=*r*]

| | |
|----------------|---|
| <i>n</i> | LPT port number (1, 2, or 3). |
| <i>columns</i> | Number of columns (80 or 132). |
| <i>lines</i> | Number of lines (6 or 8). |
| <i>r</i> | Action to take if the printer doesn't respond. Valid values are |
| E | Return error code if printer is busy. |
| B | Return busy code if printer is busy. |
| P | Retry indefinitely. |
| R | Return ready code if printer is busy. |
| N | Take no action (default). |

To initialize a serial port:

MODE COM*m*[:] [BAUD=*baud*] [PARITY=*parity*] [DATA=*data*] [STOP=*stop*] [RETRY=*r*]

| | |
|-------------|----------------------------------|
| <i>m</i> | COM port number (1, 2, 3, or 4). |
| <i>baud</i> | Baud rate. Valid values are |
| 11 | 110 baud. |

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wanted to mess with one
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| | | |
|---------------|----|--|
| | 15 | 150 baud. |
| | 30 | 300 baud. |
| | 60 | 600 baud. |
| | 12 | 1,200 baud. |
| | 24 | 2,400 baud. |
| | 48 | 4,800 baud. |
| | 96 | 9,600 baud. |
| | 19 | 19,200 baud. |
| parity | | Parity setting (N=None, E=Even, O=Odd, M=Mark, S=Space). |
| data | | Number of data bits (5, 6, 7, or 8). |
| stop | | Number of stop bits (1, 1.5, or 2). |
| r | | Action to take if COM port doesn't respond. Valid values are |
| | E | Return error code if port is busy. |
| | B | Return busy code if port is busy. |
| | P | Retry indefinitely. |
| | R | Return ready code if port is busy. |
| | N | Take no action (default). |

To display the status of a device or devices:

```
MODE [device] /STATUS
```

To redirect printer output from a parallel port to a serial port:

```
MODE LPTn[:]=COMm[:]
```

| | |
|----------|----------------------------------|
| <i>n</i> | LPT port number (1, 2, or 3). |
| <i>m</i> | COM port number (1, 2, 3, or 4). |

To prepare, select, refresh, and display code pages:

```
MODE device CODEPAGE PREPARE=[yyy [...]] [d:][path]filename]
MODE device CODEPAGE SELECT=yyy
MODE device CODEPAGE REFRESH
MODE device CODEPAGE /STATUS
```

| | |
|-----------------|---|
| <i>device</i> | Name of the device being referenced. |
| <i>yyy</i> | Code page number. |
| <i>filename</i> | Name of the code page information file. |

To set the display mode:

```
MODE CON[:] [COLS=columns] [LINES=lines]
```

| | |
|----------------|---|
| <i>columns</i> | Number of columns to display (40 or 80). |
| <i>lines</i> | Number of lines to display (25, 43, or 50). |

To set the keyboard typematic rate and delay interval:

```
MODE CON[:] RATE=rate DELAY=delay
```

| | |
|--------------|--|
| <i>rate</i> | Typematic rate (default=20, range=1 to 32). |
| <i>delay</i> | Delay interval (1=0.25 seconds, 2=0.5 seconds, 3=0.75 seconds, 4=1.0 seconds; default=2.0 seconds). |

NOTE

MODE displays over 25 lines of text on EGA and VGA video adapters and sets typematic rates and delay intervals on 84-, 101-, and 102-key keyboards. ANSLSYS must be installed for MODE CON: LINES=50 to work. If you want to switch a VGA to 50-line mode, type

```
MODE CON: LINES=50
```

To speed up keyboard operation, type

```
MODE CON: RATE=32 DELAY=1
```

MSCDEXMicrosoft CD-ROM Extensions**EXTERNAL**
SYNTAX

```
MSCDEX /d:driver /E /K /S /V /L:letter /M:number
```



New



Utility



Warning



RIP



RIP

| | |
|------------------|---|
| d:driver | Specify drive signature of device driver. Common drive signature is /MSCD0000. Multiple devices can be loaded by changing the last digit for each successive signature. |
| /E | Use expanded memory to store sector buffers. |
| /K | Provide support for Karji volumes. |
| /S | Share CD-ROM drives on network servers. |
| /V | Show memory statistics after MSCDEX is loaded. |
| /L:letter | Specify drive letter to assign to CD-ROM drive. |
| /M:number | Specify number of buffers to use. |

NLSFUNC Install national-language support functions EXTERNAL

SYNTAX

NLSFUNC [d:][path]filename]

filename Name of the file that contains country-specific information (COUNTRY.SYS).

NOTE

NLSFUNC must be installed before code pages can be prepared or selected.

POWER Power-management utility EXTERNAL

SYNTAX

POWER [ADV max|reg|min] [STD] [OFF]

| | |
|------------------------|--|
| ADV max reg min | Use Advanced Power Management specifications: |
| max | Use maximum power-conservation settings. |
| reg | Use regular (balanced) power-conservation settings. |
| min | Use minimum power-conservation settings. |
| STD | Use computer's built-in power-management capabilities. |
| OFF | Turn off power-management settings. |

NOTE

If the computer that POWER is used on does not support Advanced Power Management specifications, use of STD will disable POWER entirely.

PRINT Install print spooler EXTERNAL

SYNTAX

PRINT [/d:device] [/B:size] [/U:ticks1] [/M:ticks2] [/S:ticks3]
[/Q:qsize] [/T] [/d:][path]filename] [...] [/C] [/P]

| | |
|------------------|--|
| /d:device | Name of the device to transmit print output to. The default is PRN. |
| /B:size | Size of internal buffer (in bytes) where data is stored (default=512, range=512 to 16,384). |
| /U:ticks1 | Maximum number of clock ticks PRINT will wait for a printer to become available (default=1, range=1 to 255). |
| /M:ticks2 | Maximum number of clock ticks PRINT can take to print a character (default=2, range=1 to 255). |
| /S:ticks3 | Maximum number of consecutive clock ticks to be used for background printing (default=8, range=1 to 255). |
| /Q:qsize | Maximum number of files the print queue will hold (default=10, range=4 to 32). |
| /T | Remove all files from the print queue. |
| filename | Name of the file to print. |
| /C | Remove files from the print queue. |
| /P | Add files to the print queue. |

NOTE

PRINT should be used only to print text files. Printing binary files can produce unpredictable results.

TIME Set system time INTERNAL

SYNTAX

TIME [time]

time Current time.

NOTE

With DOS Version 3.3, the TIME command gained the ability to set the CMOS clock in a PC. In earlier versions, setting the permanent record of the time required a third-party utility.

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Circle 142 on reader service card.

PROGRAMMING

DEBUG Start program debugger

EXTERNAL

SYNTAX

DEBUG [[d:][path]filename [parameters]]

filename Name of the program to debug.
parameters Parameters passed to the program being loaded.

NOTE

DEBUG isn't of use to programmers only; it's also useful to nonprogrammers for typing in short assembly language programs and patching existing programs. For example, the commands

DEBUG COMMAND.COM

E 4369 1F

W

Q

alter COMMAND.COM to clear the screen to white on blue when you type CLS. Before you try this, be sure to make a backup copy of COMMAND.COM just in case something goes wrong.

EXE2BIN Far programmers only**QBasic** Start the QBasic interpreter

EXTERNAL

SYNTAX

QBasic [/B] [/EDITOR] [/G] [/H] [/MBF] [/NOHI] [[/RUN][d:][path]filename]

/B Start QBasic in black and white.
/EDITOR Start the DOS Editor.
/G Perform fast updates on CGA monitors.
/H Display the maximum number of lines.
/MBF Convert the built-in functions CVD, CVS, MKS\$, and MKD\$ to CVDMBF, CVSMBF, MKSMBF\$, and MKDMBF\$, respectively.
/NOHI Suppress the display of high-intensity colors.
/RUN Run the program whose filename is specified.
filename Name of the BASIC program file to load.

NOTE

You can run a QBasic program from a batch file and return control to the batch file after the program has terminated by using the /RUN switch and making the final statement in the QBasic program a SYSTEM command.

REPLACEMENTS FOR OBSOLETE UTILITIES AND PROGRAMS

DOS 6.0 makes obsolete several programs and utilities we're all used to seeing on the software distribution disks. Several programs have been replaced by newer, more functional programs, but others have not. In either case, DOS 6.0's SETVER table has been updated to allow many of the utilities to continue to function.

These obsolete programs are not included with DOS 6.0, but those who wish to continue using them can obtain them on a supplemental disk from Microsoft for \$19.95 for the entire MS-DOS 6.0 Resource Kit, or just \$5 for a supplemental disk containing just these programs (800-426-9400). Beware that future versions of DOS may not support these commands and utilities.

Following is a list of obsolete programs and a cross-reference to their replacements where applicable:

| PROGRAM | REPLACEMENT |
|----------------|----------------|
| ASSIGN | None |
| BACKUP | MSBACKUP |
| COMP | FC |
| DOSHELP | FASTHELP, HELP |
| EDLIN | EDIT |
| EXE2BIN | None |
| GRAFTABL | None |
| JOIN | None |
| MIRROR | UNDELETE /T |
| RECOVER | None |

Circle No. 710 on Reader Service Card

Jeff Prossie is the author of PC Magazine DOS 6.0 Memory Management with Utilities and PC Magazine DOS 6.0 Techniques and Utilities, both published by Ziff-Davis Press, 1993. Sally Newman is the author of MS DOS 6 Quick Reference, published by Que Development Group, 1993.



New



Updated



Utility



Warning



RIP

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DOS

Five Smart Memory Tricks To Push RAM to the Limit

FEELING A LITTLE CRAMPED FOR SPACE? THE RIGHT MOVES WILL GIVE DOS 6.0'S CONVENTIONAL RAM EXTRA BREATHING ROOM. BY JEFF PROSISE

SQUEEZE EVERY LAST kilobyte of available conventional RAM from your system with DOS 6.0.

Start with MemMaker, the memory-optimization utility in DOS. It automatically modifies your CONFIG.SYS and AUTOEXEC.BAT files, cramming as many of your device drivers and TSRs into upper memory as will fit there. Once you run MemMaker, your system will have far more free conventional RAM than ever before.

But while MemMaker automates memory optimization, there are some feats it won't attempt. To maximize free conventional RAM, you have to fine-tune MemMaker's configuration. Here are five ways to do just that.

Note: As always, when modifying your system's AUTOEXEC.BAT and CONFIG.SYS files, make a backup copy of each before you begin. Also, make

sure that you have a bootable floppy disk available in case DOS won't boot from your hard drive.

Put DOS Up and Away

MemMaker includes DEVICE commands that add HIMEM.SYS and EMM386.EXE to CONFIG.SYS. It also adds the statement DOS=UMB to make the upper memory blocks (UMBs) created by EMM386.EXE available for loading TSRs and device drivers. But MemMaker will not add a DOS=HIGH statement to move DOS to the high memory area (HMA). If, after you have run MemMaker, your CONFIG.SYS file contains a DOS=UMB command but not a DOS=HIGH command, modify the DOS=UMB line so that it looks like this:

DOS=HIGH,UMB

Just by making this simple change you

will increase the largest executable program size by 45K or more. *Tip:* Make sure that the BUFFERS setting is 40 or less. Otherwise, some of this extra RAM will be wasted.

Maximize UMB RAM

By default, EMM386.EXE and MemMaker will convert any unused space between the C600h and F7Fh segments of upper memory to UMB RAM. This method provides a tremendous improvement over DOS 5.0, which searched only about half that much space. However, there could be unused space remaining in upper memory after MemMaker is finished. Here is the method that will allow you to identify empty regions of upper memory and convert them to usable RAM.

First, run MSD (the Microsoft Diagnostics utility packaged with DOS 6.0). Select Memory from the main screen to display a map of upper memory. If the map reveals that the range C000h to C5FFh is empty, add the parameter I=C000-C5FF to the end of the DEVICE= line that loads EMM386.EXE in CONFIG.SYS. This will add 24K of UMB RAM to your system.

Second, if you did not run MemMaker in Custom Setup mode, or if you did but answered no to the question "Use monochrome region (B000-B7FF) for running programs?" then there is unused space reserved for your PC's video buffer. To compensate, add the switch I=B000-B7FF to the line that loads EMM386.EXE in CONFIG.SYS if your PC is equipped with a color video adapter. If you use a monochrome video adapter, add the switch I=B800-BFFF instead. This step will add an additional 32K of UMB RAM.

If Windows refuses to start after you make this modification to CONFIG.SYS, then you should add the following line

DOS Helper

DOSMAX

To make the most of memory below 640K, check out Philip Gardner's DOSMAX, a shareware program that moves much of DOS and its internal data structures (such as those controlled by the FILES and STACKS statements) to the upper-memory RAM created by EMM386.EXE or another upper-memory manager. DOSMAX works with DOS 3.1 and later, and the registration fee is only \$15. Look for DOSMAX.ZIP on PC/Contact, in data library 3 (Utilities/Misc.).



PCContact

to the [386Enh] section of SYSTEM.INI in order to solve the problem:

DEVICE=MONUMB.386

Get Painless EMS Memory

The one major disadvantage to allowing EMM386.EXE to emulate expanded (EMS) memory is that doing so decreases the amount of available UMB RAM by 64K. That 64K is reserved for the EMS page frame, which serves as a window into expanded memory. But with the changes in DOS 6.0, there's good news: In some instances, you can have your cake and eat it too.

If you add a FRAME=NONE switch to EMM386.EXE, it will emulate expanded memory without reducing the amount of UMB RAM, so you'll be able to load many more programs high. The only catch is that many EMS-aware applications will not run when expanded memory is configured this way, especially programs that have been written to Version 3.2 of the LIM (Lotus-Intel-Microsoft) Expanded Memory Specification. Add the switch and use your system for a few days. If this technique proves compatible with the EMS-aware applications you use, then you've just gained an additional 64K of upper memory free of charge. Otherwise, remove the switch from the EMM386.EXE line in CONFIG.SYS.

Eliminate EMS Memory

If you answered no when MemMaker asked if you run programs that utilize expanded memory, MemMaker configured EMM386.EXE with a NOEMS switch. This configuration will save 64K of upper memory, but it has one potential pitfall. If you use DOS-extended programs such as AutoCAD Release 11.x or 12.x and 1-2-3 Release 3.x, they may not run unless the NOEMS switch is followed by a number that specifies the amount of Virtual Control Program Interface (VCPI) memory that EMM386.EXE should make available to these programs.

In order to load EMM386.EXE and configure it to supply up to 4MB of VCPI memory to programs that need

Hot Tips

Mouse Pause

PCContact

Tired of tapping the keyboard every time you encounter the PAUSE statement's infamous "Press any key to continue" prompt? If you'd rather click a mouse button instead of press a key on the keyboard, use MPAUSE.COM instead of DOS's PAUSE in your batch files. MPAUSE waits until you press a key or click a mouse button—whichever you prefer.

To create MPAUSE.COM, enter this DEBUG script in an ASCII text editor and save the file as MPAUSE.SCR. Make sure you include a blank line following the final Q:

```
N MPAUSE.COM
E 0100 B8 00 00 CD 33 30 00 00
E 0108 74 23 B8 01 00 CD 33 B8
E 0110 03 00 CD 33 81 E3 07 00
E 0118 75 0A B4 01 CD 16 74 EF
E 0120 B4 00 CD 16 B8 02 00 CD
E 0128 33 B4 4C CD 21 B4 01 CD
E 0130 16 74 FA B4 00 CD 16 B4
E 0138 4C CD 21 46 8A C2 24 FE
RCX
0040
W
Q
```

The next step is to type the following line at a DOS prompt in order to make DEBUG create the program from the script:

```
DEBUG < MPAUSE.SCR
```

Then copy MPAUSE.COM to a directory in your path. To use MPAUSE, simply replace your normal batch file PAUSE statements with MPAUSE. Because MPAUSE doesn't produce a prompt of its own, you need to create your own using the ECHO statement, as illustrated in this batch file that tests MPAUSE:

```
@ECHO OFF
REM Use this batch file to test MPAUSE.COM.
ECHO Press any key or click a mouse button to continue...
MPAUSE
ECHO
```

Note: Make sure your mouse driver is loaded before you run MPAUSE. If the mouse driver isn't loaded you can still press any key to continue, but clicking the mouse will have no effect.

You can also download MPAUSE.COM free from PC/Contact; look for HOT TIP.ZIP in data library 1 (Hot Tips/Secrets).

MATTHEW WILLIS

Get Multiple-File Copies

DOS lacks an easy way to copy several files to the same location at once. Use this batch file to copy as many files as you want into one directory. To create the batch file, enter these lines in an ASCII text editor and save the file as COPYTO.BAT.

```
@ECHO OFF
SET DESTDIR=%1
:START
```

CONTINUED ON PAGE 294

it without providing EMS memory, use the following command line:

```
DEVICE=C:\DOS\EM386.EXE NOEMS 4096
```

You won't get EMS memory—so you won't lose 64K of UMB RAM—but your VCPI programs will run without problems.

Finishing Touches

If you're just a few kilobytes short of having enough upper memory to load all your TSRs and device drivers high, there are two techniques that might supply the extra RAM you need.

First, altering the order in which TSRs and device drivers load sometimes allows more of them to fit in upper memory, because some drivers require more free memory to load than they occupy once they've been installed. To determine the optimal load order, go to your DOS directory and look for the file named MEMMAKER.STS. It's a text file that MemMaker created when it analyzed your system configuration. Open it with EDIT and look for the SizeData section.

For each TSR and device driver listed in this section, note the numbers listed for MaxSize and FinalSize. You may be able to load more TSRs and device drivers high if you load those with the greatest difference between MaxSize and FinalSize earlier in the sequence. Move the lines that load those programs in CONFIG.SYS or AUTOEXEC.BAT so that they load before other TSRs and device drivers, then reboot.

The second method is even easier. If you're less than 5K short of having enough UMB RAM to load one last TSR or device driver high, add a NOHI switch to the EMM386.EXE command line in CONFIG.SYS. This prevents EMM386.EXE from loading part of itself in upper memory and increases available UMB RAM by about 5K. If the extra 5K allows you to load a 40K TSR high, then your net increase in the largest executable program size is 35K.

Still hungering for a few extra kilobytes of conventional RAM? Take a look at this month's DOS Helper, Philip Gardner's DOSMAX. With DOSMAX you can move even more of DOS high, which could gain you as much as 10K more free memory. ■

Hot Tips

CONTINUED FROM PAGE 293

```
SHIFT
IF "%1" == "" GOTO END
COPY %1 %DESTDIR%
GOTO START
:END
```

To run the program, type COPYTO followed by the destination directory and the list of files you want to copy. For example, the command line COPYTO C:\TEMP *.BAK DELETE.DOC EXTRA.WP copies all BAK files, DELETE.DOC, and EXTRA.WP to the TEMP directory on C:. To avoid COPYTO's backward destination-first syntax, create this batch file that lets you copy files using a more familiar DOS syntax. Enter these lines in a text editor, and save the file as MCOPY.BAT:

```
@ECHO OFF
SET COPYLIST=
:START
IF "%2" == "" GOTO END
SET COPYLIST=%COPYLIST% %1
SHIFT
GOTO START
:END
SET DESTINATION=%1
COPYTO %DESTINATION% %COPYLIST%
```

To use the program, type MCOPY followed by the files you want to copy and the destination directory. For example, the following command copies the same files as the COPYTO command listed above:

```
MCOPY *.BAK DELETE.DOC EXTRA.WP C:\TEMP
```

TYLER ABBOTT

Immunize Your System

It's a good idea to run your virus-checking program weekly. Because many viruses are set to take effect on Fridays, you should scan for them before then. Here's a batch file that checks the day of the week, then runs your virus checker if it's Thursday. To create it, enter these lines in an ASCII text editor and save the file as WHATDAY.BAT:

```
@ECHO OFF
ECHO @PROMPT SET WHATDAY=$D > \TMP-DAY1.BAT
COMMAND /C \TMP-DAY1 > \TMP-DAY2.BAT
CALL \TMP-DAY2
DEL \TMP-DAY2.*
IF %WHATDAY% == Thu GOTO Thursday
GOTO END
:Thursday
REM Put the command to launch your virus scanner here.
:END
```

In place of the REM line, substitute your virus checker's path and command line. Next, open AUTOEXEC.BAT in an ASCII text editor, and add the line CALL WHATDAY after your PATH statement and before any lines that run menus.

It's easy to add additional weekly duties to WHATDAY.BAT. Simply copy the line beginning IF %WHATDAY%, replace "Thu" with the three-letter abbreviation for the day you want, and replace the GOTO statement with any command you want to run.

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Boost Productivity By Limiting Windows Options

FAIL-SAFE TIPS TO CUT BACK ON WORKGROUP CONFUSION. BY CRAIG STINSON

SOMETIMES A WEALTH of Windows options can be too much of a good thing. Multiply those options by a department of employees, and you can kiss productivity good-bye. If you're responsible for a lot of people who use Windows, you can boost workgroup efficiency and reduce user confusion by setting boundaries on certain Windows activities.

The trick is to anticipate what users need to do—and need not to do. By adding settings to various Windows INI files, you can discourage users from exiting Windows, control how much they rearrange Program Manager group boxes and items, prevent them from creating new groups and items, and keep them from running programs that don't have program icons. Restrictions under Windows for Workgroups may be even more useful because they can help enforce network resource sharing.

Under the Windows 3.1 `PROGMAN.INI` file's [Restrictions] section (which you might have to add), you can, for example, remove the entire File menu by inserting the `NoFileMenu=1` setting. Or you can keep users from saving new configuration settings when they exit with `NoSaveSettings=1`.

To disable all the standard quitting commands—File Exit, Alt-F4, Alt-F-X, and the Control Menu's Close command—add the setting `NoClose=1`. `NoClose` can't prevent determined users from resetting or switching off their computers to exit Windows, but in a peer-to-peer network environment, it's a good first step to ensure that a user's shared resources remain available to others under Windows for Workgroups.

Enforce Network Sharing

If you use Windows for Workgroups as a peer-to-peer network, you can take advantage of additional INI switches designed to maintain the availability of shared resources. Add the [Restrictions] heading in `WINFILE.INI` (File Manager's INI file), and enter the line `NoShareCommands=1`. This disables the Share As and Stop Sharing functions and their File Manager toolbar shortcuts. By setting this restriction, you ensure that any directories already shared will remain shared, as well as prevent users from sharing new directories. If a shared printer is involved, you might also want to disable the sharing commands in Print Manager. Do this by adding `NoShareCommands=1` under the [Spooler] heading in `WIN.INI`.

Neither of these settings prevents users from connecting to or disconnecting from the shared resources available from other computers on the network. These settings prevent only changes to the shared status of network resources connected to the local machine. There is no INI switch

Winapp of the Month



More Control

Customize Windows more easily with Sloop Software's More Control shoreware utility. More Control offers access to several customization settings, including help-screen colors, drop-down-menu alignment, vertical spacing between icons, and icon fonts. More Control installs as a Control Panel icon, so it's easy to set up and use. Download MORECN.ZIP from PC/Contact's dot library 3 (Utilities/Misc.), or turn to page 330 to order it on disk from Public Brond Software.

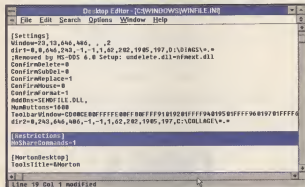
PCContact

to specifically disable the sharing functionality of Windows for Workgroup's Clipboard Viewer.

Instead, there's a global on-off switch for all sharing functionality in Windows for Workgroups: the Enable Sharing check box in the Network section of Control Panel. Removing the check turns any Windows for Workgroups PC into a client-only machine. Normally, users have full access to this switch, but you can restrict access by adding the line `NoSharingControl=1` to the [Network] section of `SYSTEM.INI`. This setting locks the current Enable Sharing state in Control Panel's Network applet. You can use this setting both to prevent users from hoarding shared resources (don't forget to include the `NoShareCommand` lines in your `WINFILE.INI` and `WIN.INI` files) and to prevent them from sharing material that's not meant to be shared.

Master Control Panel

Another way you can streamline Windows 3.1 functionality is to eliminate the sections of Control Panel that are unnecessary on a particular PC or that could cause problems if they were used incorrectly. To do this, open the `CONTROL.INI` file and add a [Don't Load] section. Beneath this heading, list any Control Panel applets you want to suppress followed by an equal sign and the word TRUE. For example, in order to suppress the Network, 386 Enhanced, and Sound Control Panel applets,



You've set up Windows for Workgroups the way you want it. Now prevent tampering by disabling the sharing functions with the `NoShareCommands=1` line under [Restrictions] in `WINFILE.INI`.

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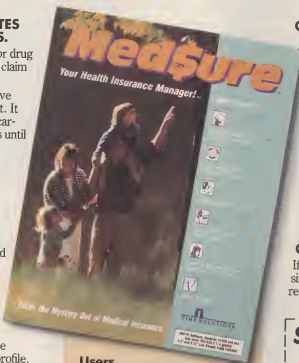
PC Computing
The Business Computing Experts



HomeOffice

PC Magazine (Jan. 14, 1992) voted MedSure "Best of 1991 Honorable Mention." They said, "It has a clean, modern, coherent interface with mouse support and lots of intelligence." PC Computing (Apr. 1992) says "The program is an excellent tool for organizing medical records, with cost savings that could easily recoup its \$89.95 list price." Home Office Computing (Dec. 1992) rated MedSure 3½ stars (out of 4). They said "Despite the sophistication of the subject matter, the program is remarkably easy to use. So easy, in fact, that I navigated the entire package with on-line help, never once opening the 95 page manual."

Specifications: Prints HCFA 1500 Form. 100% IBM Compatible, 512K RAM, DOS 2.11. Supports Microsoft Mouse



Users Praise MedSure:

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create the [Don't Load] section below:

```
[Don't Load]
Network=true
386 Enhanced=true
Sound=true
```

Getting rid of unneeded Control Panel applets also makes Control Panel load more quickly.

It's probably extreme for most business environments, but if several people share one Windows PC, you can prevent them from using Program Manager except to launch programs from existing icons. Add these lines under [Restrictions] in PROGRAM.INI:

```
NoRun=1
EditLevel=4
```

The NoRun line disables the File Run command, preventing the user from launching any program that doesn't have an icon. This setting doesn't, however, disable File Manager's File Run command, and there's no equivalent switch available in WINFILE.INI. To be sure that users launch only those programs for which you've established icons, you must remove File Manager itself.

The EditLevel=4 setting prevents users from creating, deleting, or renaming Program Manager group boxes; creating, deleting, moving, and copying program items; and modifying any properties associated with program items. If you want to give users the freedom to rearrange groups and items while ensuring that Program Manager starts each session with the same window arrangement, leave out the EditLevel setting (or use EditLevel=0) and set NoSaveSettings to 1.

For less user control, set the EditLevel parameter to 1, 2, or 3. Setting 3 lets users modify an item's description, working directory, and keyboard shortcut, but not its command line. If your principal concern is limiting access to particular executables, EditLevel=3 in conjunction with NoRun=1 is probably the appropriate restriction level.

EditLevels 1 and 2 are designed to prevent users from rearranging groups and items. When you set EditLevel to 1, you disable the New, Move, Copy, and Delete commands when they are applied to groups. When you choose File New under EditLevel=1, you go

Hot Tips

File Browsing for FileMan

Windows' File Manager lacks a vital feature found in many other file-management utilities: a file browser. If you can't identify a file's contents by name, you probably have no idea whether to delete it, move it, or leave it where it is. Sure, you can multitask with a viewer, but the process is cumbersome.

Fortunately, Windows Write can open and view almost any document file. In some file formats, much of the file may appear as nonsense characters, but you'll usually be able to figure out what it is. You can put this capability to good use by building a macro that makes Write open any selected file, regardless of its extension, at the press of a keystroke.

To create the macro, open the Macro Recorder and choose Macro, Record. Name the macro and give it a shortcut key. Make sure you've selected Playback To Same Application, Playback Speed Fast, and Ignore Mouse. Then, click on Start to begin recording.

Use the mouse to switch to File Manager, and select a file you want to examine. Press Alt-F, R to call up the File Run dialog box. Press Ctrl-X to cut the filename to the Clipboard. Type WRITE, then press Enter to bring up the File Open dialog box. Press Ctrl-V to paste the filename into the dialog box, and press Enter to open the file. When Write asks whether you want to convert the file, press N.

Then press Ctrl-Break, select Save Macro, and click an OK. Switch to the Recorder window and save the Recorder file.

To use the macro, make sure Recorder is running with the Recorder file that contains your macro. Select any file in File Manager, and press the macro's shortcut key to view it. Don't try to change the file using Write because you could easily corrupt it. When you're done viewing, exit Write without saving changes.

A simpler but less powerful method is to associate common extensions, like .TMP, .BAK, and .ME, with Write. To do this, launch File Manager and choose File, Associate, and type an extension name in the Files With Extension box. Select Write Document from the Associate With list, and click an OK. Repeat the process to associate other extensions with Write. Afterward, just double-click on files with these extensions from File Manager to view them in Write. Make sure you specify No Conversion when Write asks if you want to convert the file to Write format.

DYLAN TWENY

Put the Print Back in PrintScreen

PCContact

Do you miss the DOS PrintScreen key—the one that actually prints your screen instead of copying it to the Clipboard? Bring that function to Windows with the Macro Recorder, and you'll be able to print the screen with one keystroke.

For the macro to work, you must assign a keyboard shortcut to switch to Program Manager. (For instructions on how to do this, see "Jump Right into Program Manager," Windows Hot Tips, May, page 248.) To make Ctrl-Esc bring up Program Manager instead of the Task List, for example, open SYSTEM.INI in SysEdit or a text editor, and add this line to the [Boot] section:

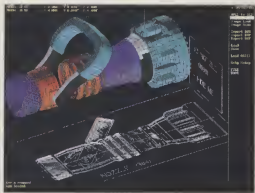
```
TASKMAN.EXE=PROGMAN.EXE
```

Save your changes, then restart Windows.

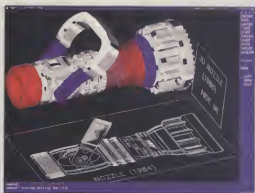
Use Macro Recorder to create the macro, and start by verifying that the Options Menu's Control-Break Checking, Shortcut Keys, and Minimize on Use

CONTINUED ON PAGE 302

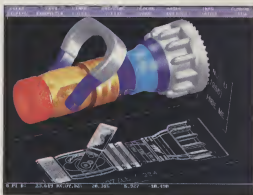
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straight to the Item Properties dialog box, bypassing the Item or Group dialog box. EditLevel=2 eliminates the same commands for items and groups.

Run Windows on the Net

Most of these Windows restrictions are accomplished with lines added to INI files, which means that users can edit them out. For the ability to permanently customize and set limits on Program Manager, Windows NT is the answer.

But if your company has networked PCs, there is a more permanent way to restrict changes to Windows files without Windows NT: Run a shared copy of Windows. When you do this, all of Windows' program and help files reside on a shared network drive, and each workstation's hard disk contains only the files necessary for that user's desktop. Users can still modify their INI files and GRP files, but they can't delete or alter critical Windows files. And users gain disk space on their PCs.

The drawbacks? The performance hit will be too substantial with anything other than small networks in many cases. Also, installation can take a fair chunk of time, depending on how many nodes are involved. And you'll still need a Windows license for each workstation.

To install and configure a shared copy of Windows 3.1 or Windows for Workgroups 3.1, you need to establish a read-only shared network directory. Then install Windows in this directory with the command SETUP /A. Next, use a text editor to edit the SETUP.SHH file in the new shared Windows directory. This file contains system settings and options for network installations. One particularly useful option is the [dontinstall] section, which lists Windows components—such as accessories, games, and screen savers—that won't be installed on workstations.

To configure each network node to share Windows, log it to the network Windows directory and type SETUP /N on the DOS command line. Follow the prompts to install Windows with the options and exclusions specified in SETUP.SHH. This copies INI files, GRP files, and a few EXE files to the workstation's hard disk. After the installation, make any changes that you like to the INI files, and repeat for each workstation that will share Windows. ■

Hot Tips

CONTINUED FROM PAGE 300

items are checked. Then select Macro, Record, and type PrintScreen in the Macro Title box. Specify a shortcut keystroke, and select Play Back to Any Application. Check that the Record Mouse box is set to Ignore Mouse. Then click on Start to begin recording.

Press the PrintScreen key to copy the current screen to the Clipboard (on some systems, you need to press PrintScreen twice). Then press the Program Manager hotkey combination you established. Once in Program Manager, press Alt+F, R, type PBRUSH, and press Enter to launch Pointbrush.

From Pointbrush, press Alt-O and Enter to call up the Image Attributes box, then press Alt-D and Enter to set the default image size to the size of your screen. Press Ctrl-O to zoom out to full-screen view. Then press Shift-Ins to paste the Clipboard's contents into the new Pointbrush document. A hatch pattern will appear. Press Tab, then Ins, and the hatch pattern will be replaced by a pixelated version of the screen you just captured.

Next, press Ctrl-N to zoom in, and Alt+F, P to bring up the Print dialog box. Press Alt-D if you want to print in draft mode, then press Enter to send the file to the printer. Finally, press Ctrl-Break to stop recording. Select Save Macro, click on OK, return to the Recorder, and save the macro file as SCRNAP.REC.

To use the macro, Recorder must be running in the background with SCRNAP.REC loaded. Press the macro's keyboard shortcut at any time to print the current screen. Then, if you want to save the image, choose File, Save from Pointbrush. Otherwise, you can exit Pointbrush without saving. Note: Avoid leaving unsaved images open in Pointbrush when you run SCRNAP.REC, because the macro won't run if Pointbrush prompts you to save a file.

To make Recorder load automatically, place a copy of its icon in the StartUp program box. Run Recorder from this icon, and open SCRNAP.REC. Use File, Properties to make Recorder minimize on launch.

You can download macros for viewing and printing screens: Look for VIEWER.REC and PRINTSCR.REC in the file HOTIP.ZIP, in data library 1 (Hot Tips/Secrets) on PC/Contact.

MATTHEW LAKE

Show Your Best Colors

Do you have the perfect Windows color scheme—and wish everyone else in your company could start using it? Maybe it's optimized for laptop use, for instance, or

it uses your company's colors. Distributing a useful color scheme to other Windows users is easier than you might think.

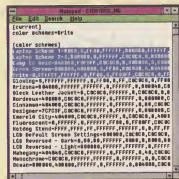
First, save the color scheme. From Control Panel's Color applet, check whether there's a name in the Color Schemes box. If not, click on the Color Palette button, click on Save Scheme, and enter a name. Then click on OK and exit Control Panel.

Use Notepad or a Windows text editor to open CONTROL.INI from your Windows subdirectory. Under [color schemes], find the line that begins with the name of your

color scheme and select it along with the lines of any other color schemes you want to distribute. Then copy and paste the lines into a new text file.

Others can use Notepad to copy the lines from this file and paste them into the [color schemes] sections of their CONTROL.INI files. After they save their changes, the new color schemes will appear in Control Panel's list.

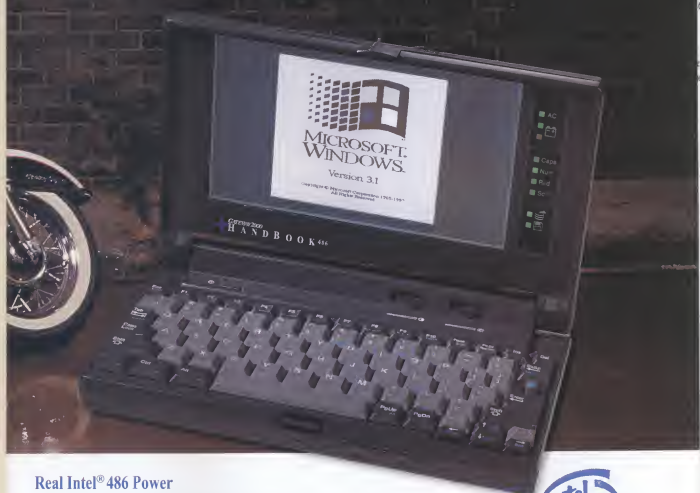
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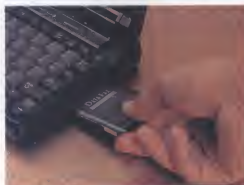
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FEATURES

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BOILERPLATE DOCUMENTS

Tired of cutting and pasting an old invoice every time you bill a customer? Turn a commonly used file type into a boilerplate document that you can reuse and quickly update with a macro.

First, go through the document and replace any text that's particular to the old project with the symbol @@. The @@ symbol marks every place where you'll need to enter new information. Save the document with a new name. Next, type the following lines into a new document, and save it in your macro directory with the name BOILER.WPM:

```
Application (WP;WPWP;Default;
"WPWPus.WCD")
Label (AGAIN)
SearchText (SearchString:"@@";
SearchDirection:Forward!;
SearchScope:Extended!)
DeleteCharPrevious ()
DeleteCharPrevious ()
Pause
Go (AGAIN)
```

To create a new document based on the boilerplate, retrieve the boilerplate document and position the cursor before the first @@. Then choose Macro, Play, and run the BOILER macro. The macro finds each @@, deletes the symbols, and pauses for you to enter new text. When you've entered the text, choose Macro, Pause, and the macro will move to the next @@ symbol. When the last @@ has been replaced, the macro will flash a message that it is being terminated. Click on OK, and your document is ready to print.

JUDY HOUSMAN
CAMBRIDGE, MASSACHUSETTS

WORD FOR WINDOWS

LAUNCH APPS FROM WINWORD

Launch your favorite utilities from any Word for Windows 2.0 menu or the toolbar with a Word BASIC macro. To launch the Windows File

Manager, for example, click on Tools, Macro. In the Macro Name field, type FILEMANAGER, then click on Edit. Add the following line between the Sub MAIN and End Sub lines:

```
Shell "C:\WINDOWS\WINFILE.EXE"
```

Click on File, Close, and answer Yes when you're prompted to save

the macro. Then add it to a menu by selecting Tools, Options, and the Menus icon. Select a menu from the drop-down list. Make sure that Macros is selected in the Show box, then select the FileManager macro in the Macros box and click on Add. Place an ampersand (&) before the letter in the menu name that you want to use as the menu item's shortcut key. You can also change the menu name. Click on Close to close the dialog box. To run the



Step by Step: Ami Pro 3.0

LAUNCH ANY APPLICATION WITH A SMARTICON

Because it's inconvenient to switch to Program Manager to start another app, use a macro to load programs from within Ami Pro.

Step 1. Create a new macro by copying the SMARTTEXT.SMM macro.

Use File Manager to copy SMARTTEXT.SMM from your Ami Pro MACROS subdirectory to a new file with an .SMM extension.



Step 2. Open the new macro.

In Ami Pro, choose Tools, Macros, Edit. Highlight the copied macro in the Macros list, and choose OK. Ami Pro displays the macro code in the document window.



Step 3. Modify the macro.

Change the APP= and DEFDIR= lines to your program's command line and default directory, respectively; change APPNAME= to the program's name under Windows. For a macro that loads Control Panel, for example, use these settings: APP="CONTROL EXE", APPNAME="CONTROL PANEL", and DEFDIR="C:\WINDOWS".

Choose File, Doc Info, and change the macro's description, click on OK, then choose File, Close, and save your changes.



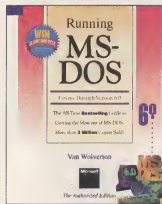
Step 4. Create a Smarticon.

Select Tools, SmartIcons, and click on Edit Icon. Click on New Icon and specify a name for the icon file. Design your icon, then select the new macro (CTRLPTL.SMM, in this example) from the Macros list. Click on OK to return to the SmartIcons dialog box. Drag your new icon from the Available Icons list on the left onto the current palette and click on OK, and the icon will appear on the toolbar. Next time you need the application, it's just a mouse click away.

GEORGE BEINHORN
NEVADA CITY, CALIFORNIA



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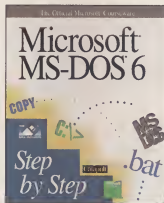
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macro, pull down the menu and click on the File Manager menu item. Use Tools, Options, Toolbar to add the program to your toolbar.

Create macros to launch other programs in the same way. Include the program's full path and command line between the quotation marks.

DYLAN TWENEY
ASSOCIATE EDITOR

PRINT JUST WHAT YOU SELECT

Save time by eliminating extra keystrokes when printing highlighted text. First, highlight text in a document. Create a macro by choosing Tools, Record Macro, and name the macro PrintSelected. Assign Ctrl-Shift-P as the hotkey combination, and click on OK. Choose File, Print, and click on the Selection radio button in the Range box.

Finally, click on OK to print the text. Stop the Macro Recorder by clicking on Tools, Stop Recorder. To print any selection, simply highlight it and run your macro with Ctrl-Shift-P.

ROBERT BAYLEY
ASSISTANT EDITOR

AMI PRO 3.0

RESURRECT A DELETED FRAME

If you produce a monthly report that includes graphs or other images, you probably want to keep a consistent frame style and just change the image. The only problem: When you delete a framed image, you lose both the image and the frame. You can retrieve a deleted frame easily with a temporary macro that restores the old frame attributes.

First, add the Toggle Quick Record Start/Stop and Play Back A Quick Macro SmartIcons to the button bar by selecting Tools, SmartIcons. Choose the icons from the Available Icons list, drag them to your button bar, and click on OK.

Select the frame that holds the image you want to delete, and click on the Toggle Quick Record icon to start recording. To activate the Modify Frame Layout dialog box, click the right-mouse button, then click on OK. Click on the Toggle Quick Record icon again to stop recording, then

delete the selected frame and graphic. Next, create a new frame anywhere on the page. Then click the Play Back A Quick Macro icon in order to set the new frame in the same position, size, and style as the old frame. Finally, import a new graphic into the frame.

DANIEL GASTEIGER
CAMBRIDGE, MASSACHUSETTS

LOTUS 1-2-3 4.0

TURBOCHARGE YOUR MACROS

When you run a big macro, you want to tap in to all the speed you can get. Here are three things you can do to speed up 1-2-3 macros by limiting time-consuming redraws.

If you use the Wysiwyg add-in,

Step by Step: Lotus 1-2-3

COMPLEX DATA QUERIES MADE EASY

Need to perform a complicated query on a spreadsheet database? Don't tangle with Boolean logic statements—use this method to create queries quickly and easily in 1-2-3 for Windows 1.x and 1-2-3 for DOS 3.x.

Step 1. Organize your database.

Arrange field names across one row in your worksheet, and your data in columns below.

Copy the raw of field names and paste it below the database. Then type in your criteria beneath the appropriate field. Put criteria on the same row if a record must meet all conditions (equivalent to an AND statement), and on separate rows if a record must meet only one to qualify (equivalent to an OR statement). In this example, the query will find records of all employees in the features department as well as all employees who have salaries between \$20,000 and \$30,000.

Note: You can repeat field names to specify multiple criteria for one field without getting into trouble.

Step 2. Select the output range.

To display the records that match your search, copy the field names and paste them to one side of the database. Make sure there are enough blank rows beneath the field names to hold the query results.

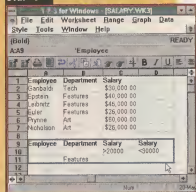
Step 3. Display the query results.

From the Main Menu, choose Data Query. For Input, select the database or portion of the database you wish to search, then go to Criteria and select your criteria, including the field name cells. Go to Output and select the output field name cells. Then choose Extract.

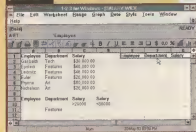
1-2-3 places all records that meet the criteria in the spreadsheet. In this case, Epstein, Leibnitz, Euler, and Nicholson will be placed in cells E2 through G2.

LYDIA LEE
EDITORIAL ASSISTANT

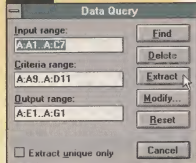
STEP 1



STEP 2



STEP 3





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2.

More compatible.

Unlike other cards claiming "Sound Blaster compatibility," the Sound Blaster 16 is 100% compatible with every software application ever written for the Sound Blaster.

Which is to say, virtually every application available for sound. Whatever the application, it works better—and sounds better—on a Sound Blaster 16.

And with Sound Blaster 16 it's easy to add CD-ROM—the interface is built right onto the card, so you don't use up an expansion slot. There's no problem with SCSI incompatibility either, and no need to fuss with manual switch settings to get industry-standard Sound Blaster performance.

3.

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Sound Blaster 16's unique modular, scalable platform allows you to add more advanced features and technologies as you need them.



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It's perfect for use with large or complex sound files. And it's built on a single chip that mounts directly into the Sound Blaster 16 card, so hardware installation is a matter of seconds.

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Upgrading is as simple as plugging in a daughter board.

daughter board and you've got over 250 sampled sounds—everything from a 9-foot Kawai® concert grand piano to ear splitting electric guitar effects—right at your fingertips.

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Our exclusive VoiceAssist speech recognition software is a sophisticated input device that gives you hands-free control of Windows applications with a high-accuracy library of 30,000 voice commands. And it's free with your Sound Blaster 16. We even include the high performance microphone that goes with it.

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Hands-free voice control.

5.

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|---|-----------------------------------|--|
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| Playback rate | 44.1 KHz | 44.1 KHz |
| Dynamic Range | 95dB | 94dB |
| Signal-to-Noise | 85dB | 80dB |
| Upgradability | | |
| Advanced Signal Processing | Yes | None |
| Sampled Wave Synthesis | Wave Blaster | None |
| Speech Recognition | | |
| VoiceAssist Software | Included | Optional kit sold separately (\$79) |
| Bundled Software | | |
| Multimedia Encyclopedia | 5 DOB/Windows utilities | |
| HCS Interactive | | |
| PC Animate Plus | | |
| Monologue for Windows | | |
| SD DOB/Windows utilities | | |
| Compatibility | | |
| 100% compatible with all Sound Blaster software | | 8-bit Sound Blaster only (with switched emulation) |

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Circle 187 on reader service card.

switch from graphics mode to text mode by placing the command :DMTQ at the beginning of your macro. Use the command :DMGQ at the end of the macro when you want to return to graphics mode.

To make macros run faster in Windows, place the {WINDOWSOFF} command on the first line to suppress screen redraws. The {WINDOWSON} command at the end of the macro turns redraw back on.

Similarly, {PANELOFF} suppresses the rewriting of the menu and edit lines above the worksheet until it encounters the command {PANELON}.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

QUATTRO PRO FOR WINDOWS

SAVE WHAT-IF MAXIMUMS

Keep track of your what-if calculations in Quattro Pro for Windows

with cells that remember the maximum value returned by a calculation and the input values that produce that result. When you're working with an investment-return formula, for example, you'll want to remember the maximum return as well as the investment amount that produces that result.

Remembering those values is a straightforward matter when you make use of the @IF function and circular cell references. Set up the following formulas in a worksheet to test this technique:

| A | B |
|-------------------|------------------------|
| 1 Investment | |
| 2 Return | =2*B1^2-0.005*B1^3+100 |
| 3 Maximum return | @IF(B2>B3,B2,B3) |
| 4 Best investment | @IF(B3=B2,B1,B4) |

Cell B1 is the input cell for the formula in cell B2, which calculates the return on investment of the amount in

B1. As you increase the value in B1, the return in B2 fluctuates, but B3 and B4 remember the maximum return and the investment amount that produces it, respectively.

Cell B3 retains the maximum value produced by B2. If the value of B2 is less than B3's previous value, the @IF statement retains B3's current value. If B2 is greater than B3's current value, it inserts the value of B2 into B3. Cell B4 then checks to see whether B3 is the same as B2—if it is, B3 holds the maximum value so far, and therefore the current value of B1 goes into B4.

To clear the values held in cells B3 and B4, first set B1 to zero. Then move to cell B3 and press F2, space bar, and then the backspace key (to delete the space you just inserted). This forces a recalculation and resets all the cells to zero.

MATTHEW WILLIS
COURTICE, CANADA

PC NETWORKING IS COMPLICATED, EXPENSIVE AND SCARY.

APPROACH

HOME IN ON A RANGE

Want to obtain a list of all customers who spent between \$1,000 and \$2,000 on products last year? Or all sales that were made outside a sales promotion period?

Approach makes it easy to cull a list of records in a specified range, such as all the records with Customer Order numbers between 1001 and 2001. While in Browse mode, click on Records, Find, type in >1001 & <2001, then press Enter.

To find records outside of a specified range, select Records, Find. Make sure you're in Browse mode and type <1001 in the Customer Number field. Without pressing Enter, select Records, Find More, type >2001 in the new search field that drops down, then press Enter to end the query. Now you can browse through all values that fall

outside the specified range by using the arrow icons on the button bar.

JOHN TASCHEK
ASSISTANT EDITOR

dBASE IV

RING MY BELL

Need a warning bell distinct from the default dBASE bell for an invalid entry or an audio prompt that calls attention to a message? Enter this procedure using dBASE's MODIFY COMMAND feature or a word processor that saves ASCII text.

```
PROCEDURE WARNBELL
SET BELL TO 890,4
?? CHR(7)
SET BELL TO 1400,4
?? CHR(7)
SET BELL TO 1000,4
?? CHR(7)
SET BELL TO
RETURN
```

Save the file as WARNBELL.PRG. Call up the procedure from any dBASE program or run it from the dBASE dot prompt to test it.

CLIFF LAPIERS
SANTA ANA, CALIFORNIA

PARADOX FOR WINDOWS

FOOLPROOF DATA ENTRY

Correcting database misspellings and miscategorizations is part of the tedium of manual data entry. Instead of wondering who listed Dr. Matrin as an OEM, you can effectively increase your data entry speed and accuracy by utilizing drop-down lists.

The first step is to open your form in the design edit mode. If you do not have advanced menus, you can simply select Properties, Desktop, choose the Advanced ObjectPal level, and then click on OK.

Now choose the field where you want the drop-down edit list to

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Circle 101 on reader service card.

appear, then right-click on the field. Choose Display Type, Drop-Down Edit, and click on OK. On the button bar, click on the Object Tree. From within the Object Tree dialog box, right-click the #List object. If the full Object Tree is displayed, close the dialog box and reselect the field via the drop-down edit list and then click on the Object Tree icon.

Choose Methods and double-click on the Open method from the Built-In Methods list. If you want to create a drop-down list of customer names from the Name field in the Customer table, enter the following command between the method and endmethod lines:

```
self.DataSource = "Customer.Name"
```

Close the Object Tree by double-clicking on the control menu.

Now you can test your new pick list by simply clicking on the lightning bolt icon to run the form. Click once on the down arrow in your drop-down field if you want to view the customer names.

WILLIAM BEEM
ORLANDO, FLORIDA

PC TOOLS FOR WINDOWS

MOVE APPS BETWEEN DESKTOPS

Do you want to move an open application to a different desktop in PC Tools for Windows? You could save your work, close the file, exit the program, then switch desktops and restart the application.

A better solution, however, is to click on the CPS icon in the upper left corner of the program's title bar and select Tag Along. Then switch to your new desktop using MultiDesk or the Desktop drop-down list. Finally, select Tag Along again to make the application stay on the new desktop.

WILLIAM BEEM
ORLANDO, FLORIDA

Do you know a better, faster, easier, or more effective way to use software applications? Share it with others, and we'll send you \$50 if we publish your secret. Send your tips, along with your name, address, and daytime phone number, to Software Secrets, PC/Computing, 950 Tower Lane, 20th Floor, Foster City, CA 94404. ☐

Step by Step: Microsoft Access

SELF-COMPLETING ADDRESS FORMS

Reduce mistakes and speed up data entry with forms that automatically fill in fields with the correct city and state after you enter a zip code.

Step 1. Create a database and table.

Create a database and a new table with the field names filled in as shown at right. Save the table.

Step 2. Add an Access Basic function.

Click on the Module icon, then on the New button to add on Access Basic function to the database. Type in the following lines:

```
Function GetData ()
Forms!Form1.City =
DFirst("[City]", "Table1",
"[Zip]" = Forms!Form1.Zip")
Forms!Form1.State =
DFirst("[State]", "Table1",
"[Zip]" = Forms!Form1.Zip")
GetData = Zip
```

Table 1 is the name you used in Step 1, Form 1 is the name of the form you'll create in Step 3, and the field names in brackets are Table1's fields. (Note: If you have already entered a table of zip codes and their cities, substitute the table's name and field names in the code.) Access automatically adds the line End Function to the code.

Select File, Save, and then close the module.

Step 3. Create a form.

Click on the Form icon and the New button to create a form. Choose Select a Table/Query, and follow Wizard's prompts. Title your table and click on the Design button. Save the form with the name you used in step 2.

Step 4. Automate the form.

Highlight the zip code field and select View, Properties to open the field's properties box. Type =GETDATA() in the After Update property field. Close the property box and save the changes to the form with File, Save.

During data entry, if your table already contains a zip code, the program will automatically complete the City and State fields. If you use a separate zip code database for your lookup table, you'll never misspell a city or state again.

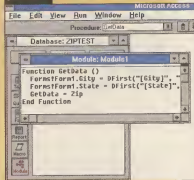
A dBASE file (which can be imported to Access) of all U.S. zip codes is available on PC/Contact under the filename ZIPCOD.ZIP in data library 2 (Templates/Macros).

WILLIAM BEEM
ORLANDO, FLORIDA

STEP 1

| Table: Table1 | | |
|---------------|-----------|--|
| Field Name | Data Type | |
| First Name | Text | |
| Last Name | Text | |
| Street | Text | |
| Zip | Text | |
| City | Text | |
| State | Text | |

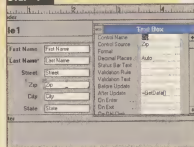
STEP 2



STEP 3



STEP 4



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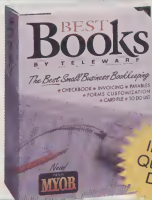
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Circle 156 on reader service card.

Database File Structure

HOW DATABASES STRUCTURE AND STORE INFORMATION ON DISK.

BY RON WHITE AND DYLAN TWENEY • ILLUSTRATION BY TIMOTHY EDWARD DOWNS

Database programs are designed to store a wide variety of information on disk and retrieve it quickly and efficiently. dBASE and XBase databases can structure data in fixed-length-field and variable-length-field formats.

DBF The primary file format is fixed-length field, or DBF. A DBF file consists of a series of data laid down in one stream. Maximum character lengths are allotted to each field in the header data at the top of the file.

DBT Databases that contain variable-length fields, or *memo fields*, store them in one continuous data stream in a separate DBT file and special DBT format. The database software accesses DBT memo fields from the DBF file using coded pointers that refer to the memo field locations stored in a DBT file of the same name.

DBF header information

Character length

Field Structure

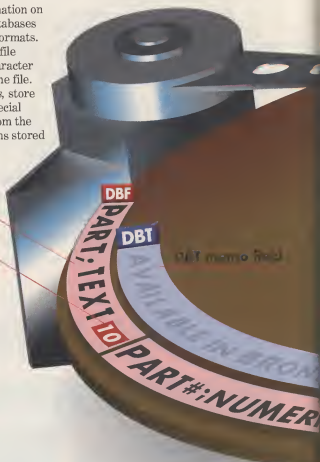
DBF The beginning of a DBF fixed-field file contains header information that defines each field's name, data type (unless it's a date or currency field), and character length. The structure can also include information on the format of the data in the field, such as the *mm-dd-yy* format for date fields.

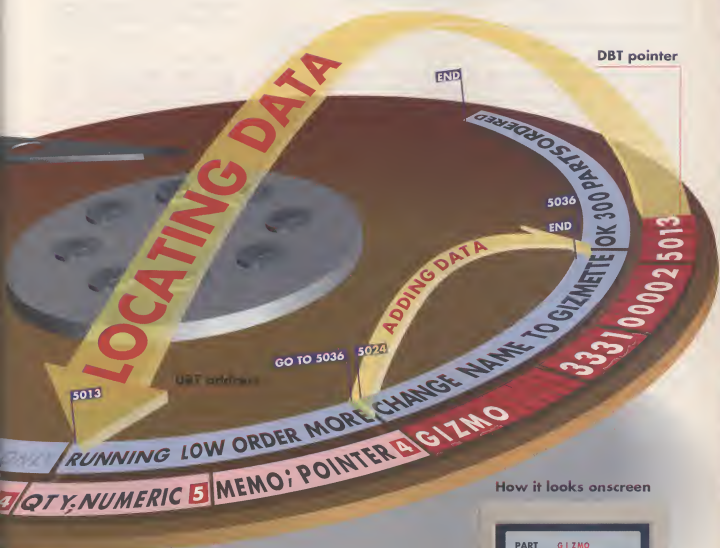
DBT The memo fields in DBT files can store any amount of data. Memo fields are used primarily for comments that explain or annotate fixed-length fields in the DBF file.

Locating Data

DBF To find a given record in a DBF file, the database program calculates its *offset*—that is, the sequential distance between the first record and the one you're searching for. It uses a simple formula: The number of the record (as stored on disk), multiplied by the total length of each record, equals the starting point of that record. To locate a field within a record, the program follows a similar process, calculating the number of allotted bytes for all fields preceding the one it wants to find. Then it asks DOS to locate the data beginning at the calculated offset.

DBT The process of locating a DBT field is different: A DBF pointer directs the database program to the address of the field in the DBT file—here, 5013. When a user accesses that field, the database software searches the DBT file for that location and reads the text until it finds a code marking the end of the memo field.





How it looks onscreen



Adding Data

DBF As you add records to a DBF file, they're simply placed at the end of the file in the order in which you enter them.

DBT DBT files, by contrast, are organized by field rather than by record. When you add text to a DBT field, the database directs the new data to the end of the DBT file and replaces the original end-of-field marker with a pointer to the location of the new text. A new end-of-field marker is then generated at the end of the added text.

In a DBT file, all comments in a memo field are displayed in the same place onscreen: On the monitor at right, the comments "Running low order more" and "OK 300 parts ordered" appear together. On disk, however, the comments can be separated: Here, a pointer at the end of the first comment directs the database to a new location—address 5036—because the record's second comment was entered after the comment "Change name to Gizmette" was added to a different record.

CRACK YOUR PC RIDDLES WITH HELP FROM PC/C'S ANSWER GUYS. BY DALE LEWALLEN AND JEFF PROSISE

Break the Mac-to-PC Barrier

I'd like to transfer text files created on my old Macintosh and stored on single-sided 400K floppy disks to my new 486 machine. Computer stores will transfer the files for a fee, but they charge for each file and the cost would be prohibitive. Is there an inexpensive software or hardware solution that you can recommend?

JAMES M. GAMBILL
SUMTER, SOUTH CAROLINA

Most Macs shipped in the past four years have disk drives capable of reading and writing DOS disks. Computer stores typically create a DOS-compatible disk on a properly equipped Macintosh and use that to transfer your files.

If you have an older Mac, your best bet is either Central Point Software's \$179 Deluxe Option Board, which plugs into ISA- and EISA-bus PCs and lets DOS floppy drives read Mac disks (check with Central Point for a list of compatible drive types), or Traveling Software's \$149 LapLink Mac, which transfers files by cable between Macs and PCs. All the necessary hardware and software are supplied. For more information, contact Central Point Software at (508) 690-8090. *Circle Reader Service No. 705* Contact Traveling Software at (206) 483-8088. *Circle Reader Service No. 706*

Convert GIF to BMP for Free

I'm looking for an inexpensive utility to convert CompuServe GIF graphics files into Windows' BMP format. Do you know of one?

GILBERT OCAMPO
MOUNTAIN HOME, IDAHO

We sure do, and it's free! We've put a program that converts GIF files to BMP format onto PC/Contact, *PC/Computing's* online forum. If you're a member, type GO PCCONTACT and download GIF2BM.ZIP from data library 3 (Utilities/Misc.). For information on joining PC/Contact, see page 330. There's no registration fee for GIF2BM.ZIP—a great tool for converting GIF files that abound on CompuServe into Windows wallpaper.

If you're looking for a source of colorful BMP wallpaper files and icons, check out the Windows New User's Forum on CompuServe. At any CIS prompt, type GO CIS:WINNEW and you can browse through library 16 (Icons and Bitmaps).

If you're looking for graphical images and programs to manipulate those pictures, go to the CompuServe Graphics forums. These 12 forums contain thousands of images from around the world, including great collections of images from NASA and the U.S. National Park system.

Make DEL Less Dangerous

Is there a way to change the DEL command so that it always asks for confirmation before deleting files?

LINDA SIMONETTI
GREAT NECK, NEW YORK

There sure is: Define a DOSKEY command macro that runs DEL with the /P switch, which prompts you to confirm each deletion. All you have to do is add the command

DOSKEY DEL=DEL \$1 /P

to your AUTOEXEC.BAT file. This command defines a macro called DEL that invokes the DEL command with a /P switch, passing it the filename that you entered on the command line (\$1). This works because DOS runs

Help About...

GETTING REALISTIC IMAGES

THE OTHER DAY, I SAW AN IMAGE ON A MONITOR THAT LOOKED VERY LIFELIKE. I WAS SURPRISED TO LEARN THAT THE IMAGE WAS BEING DISPLAYED AT A RESOLUTION OF ONLY 320 BY 200 PIXELS. I ALWAYS THOUGHT THAT HIGHER RESOLUTIONS WOULD LOOK THE MOST REALISTIC—WHAT'S THE TRICK?

LYLE CRAWFORD
MADISON, WISCONSIN


In a perfect world, you'd have high screen resolution coupled with many colors. But with computer technology as with life in general, you have to make some compromises. If your goal is to have an image look as realistic as possible, great color depth (the number of colors) is almost always preferable to high screen resolution. To give you a point of reference, on average television screen has only about 300 horizontal scan lines, compared to VGA's 480 horizontal scan lines—but each pixel on the television can display on almost infinite number of colors. In contrast, a standard VGA screen doesn't look so sharp as a television image because each pixel can display only 16 colors. As you increase both the number of colors and the resolution, images look much more realistic.

Try this experiment: Download a 256-color GIF file from CompuServe or your local BBS. With your video card manufacturer's included software or the Windows Setup program, set your monitor to display 256 colors of VGA resolution, and view the image using an image-editing program that can display GIF files. Then, reset your monitor to display only 16 colors (standard VGA resolution) and look at the image again. Finally, set your screen for a higher resolution (like 800 by 600) without changing the color depth, and see what happens. Increasing the resolution of the image doesn't help at all unless you allow for more colors than VGA's standard 16.



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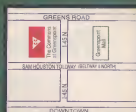


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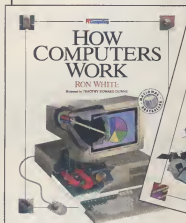
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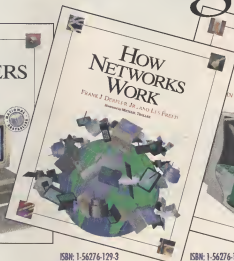


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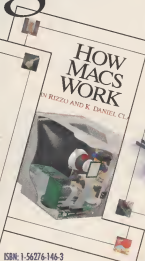
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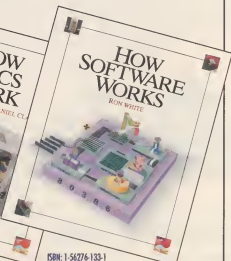
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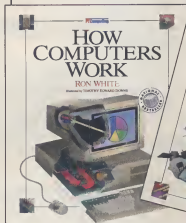
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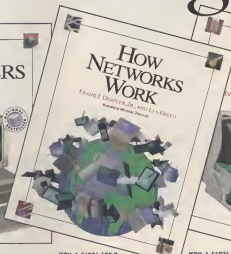
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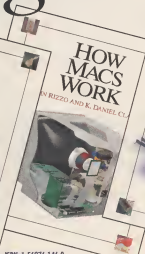
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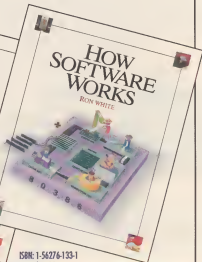
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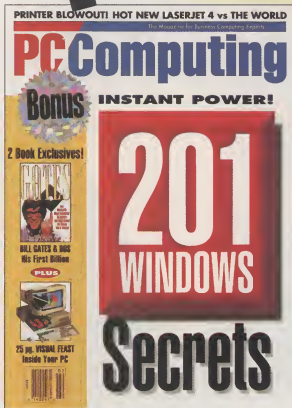
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macros before internal DOS commands. Use the same technique for any other DOS commands for which you want to set default switches.

If you have a 386 or 486 configured to load programs into upper memory, load DOSKEY into upper memory by inserting a LOADHIGH command in front of the first DOSKEY command. Doing so will save you more than 5K of conventional memory.

Optimal Load Order

386Max's automated setup utility, Maximize, asks about the "load order" of programs. Apparently, changing the order in which programs are loaded high will let me fit more programs in upper memory. However, I'm unsure of the best load order. Can you advise?

TODD SMITH
MORRISVILLE, NEW YORK

You don't have to determine the optimal load order; Maximize does it for you. Here's how: When Maximize performs a full optimization, it analyzes your current configuration to see if a program requires more memory as it loads than it does once it's installed. If so, loading that program earlier allows you to load more programs high.

Let's say you have 50K of upper memory available and two TSRs—program A and program B—whose installed sizes are 20K each. Program A temporarily requires 20K of buffer space in addition to its 20K installed size—so it requires 40K of free upper memory to load. If program A is loaded first, there will be 50K of upper memory available and it will load fine. But if it's loaded after program B, only 30K of free upper memory will remain, which is not enough space to accommodate program A plus the buffer it needs to load, so program A will revert to low memory.

Maximize recognizes such conditions and offers to optimize the load order for you. It asks for your permission and gives you a chance to designate programs whose relative ordering should remain unchanged. For example, if you're loading a program from a network drive, you need to load your network software first. Simply mark any programs that should not be

Challenge

IS IT POSSIBLE TO HAVE MY PC KEEP A LOG OF WHEN IT IS TURNED ON EACH DAY? THIS WOULD BE USEFUL INFORMATION TO KEEP ON FILE, AND IT WOULD ALSO LET ME KNOW IF ANYONE TURNED ON MY PC WHILE I WAS AWAY.

MARTIN SENNA
TYLER, TEXAS

With an increasing number of people working from home, and the IRS requiring more documentation to support PC-related deductions, it's only natural to want to track their usage. While there are commercial and shareware programs available for this, we're curious to see how creative you can be using only batch files or DEBUG scripts. At the least, your program should record when the PC is turned on each day, but the winner of the Challenge will enhance the program to track on and off times, which applications are being used and when, and so on.

Are you up to tackling this month's Challenge? If you are, just drop us a letter marked "September Challenge." If we publish your solution, we'll convey our appreciation by sending you \$50.

MAY CHALLENGE SOLVED

The May Challenge was from a *PC/Computing* reader who had tried in vain to track his company's invoices with Barland's Paradox for Windows. Because Paradox lacks a counter field type, Samuel Granville was unable to create a field that would automatically increment a serial number each time that a new record was added to the database.

The winner of the May Challenge is Jamie FASTER of Pismo Beach, California. Jamie's simple solution is to keep a separate database, NEXT.DB, that contains just two fields: File, which holds the name of a table, and Next Number, which holds

the serial number of the next record to be added to the table. The File field must have the word CUSTOMER as its first record. The Next Number

| | Field Name | Type | Size | Key |
|---|-------------|------|------|-----|
| 1 | File | A | 15 | |
| 2 | Next Number | N | | |

field should have a starting number as its first record.

Then, in a form for the invoice table (which uses these serial numbers in its Invoice Number field), Jamie created a button with the following ObjectPac code inserted between the method and endmethod lines:

```
method pushButton(var eventInfo Event)
var
newCustNum Number
NextTc TCursor
endvar

NextTc.open("NEXT.DB")
NextTc.locate("file","customer")
newCustNum=NextTc."Next Number" + 1
NextTc.edit()
NextTc."Next Number"=newCustNum
NextTc.close()

NextTc.open("invoice.db")
NextTc.edit()
NextTc.InsertAfterRecord (NextTc)
NextTc."Invoice Number"=newCustNum
NextTc.close()

endmethod
```

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This Month's Hot Software Downloads

| TITLE | FILENAME | DESCRIPTION | LOCATION |
|--------------------------|--------------------------|---|-------------------|
| Above and Beyond | ABVBND.ZIP | Personal Information Manager for Windows. Features alarm clock, calendar, text editor, auto dialer, and scheduler. | PBSAPPS LIB 5 |
| Paint Shop Pro | PSPRO.ZIP | Windows screen capture, file conversion and image-editing system — trim, resample, filter, gamma correction and more. | PBSAPPS LIB 8 |
| Winvelope | WINVEL.ZIP | Envelope printing utility for Windows. Also prints postal bar codes. | PBSAPPS LIB 4 |
| Castle of the Winds | \$CASTL.ZIP | Fantasy game for Windows based on Norse mythology. 100 unique monsters oppose your quest. | PDS ARCADE LIB 4 |
| MONSTER BASH | BASH.ZIP | Brave an enchanted world of zombies, skeletons, vultures, and walking hands! May not be suitable for young children. | PBS ARCADE LIB 3 |
| WINPAK #1 & #2 | WNPAK1.ZIP WNPAK2.ZIP | 4 animated screen savers, 2 True Type fonts and over 100 icons for Windows 3.1. Listed in <i>PC Computing</i> "BEST BETS" section (May 1993!) | PBSAPPS LIB 8 |
| Icondos | ICNDOS.ZIP | Graphical DOS application launcher with clock, calendar, screen saver, over 100 icons and 20 wallpapers. | PBSAPPS LIB 6 |
| After Dark Screen Savers | ADMODS.ZIP | A collection of screen-saver modules, including the world-famous "Bungee Jumping Cows." Requires "After Dark." | PBSAPPS LIB 8 |
| C Tutor | CTUTOR.ZIP | Interactive C tutorial with step-by-step C programming coverage. | PBS ARCADE LIB 10 |
| SIMSTAT | SIMST1.ZIP SIMST2.ZIP | Powerful statistics program. Includes multiple regression, time series analysis, nonparametric analyses, bootstrap simulation, hi-res graphs, etc. Reads 1-2-3, dBase, ASCII, SPSS/PC+ files. | PBSAPPS LIB 9 |

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This Month's Free Software and Shareware

All the public-domain and shareware programs, batch files, and utilities featured in *PC/Computing* each month are available on our online service, PC/Contact, or on disk from Public Brand Software for a fee. Shareware requires additional payment to authors for continued use. Here's a sampling of the programs you'll find this month.

More Control.....Windows, page 298
Not completely satisfied with Control Panel's options for customizing Windows? More Control, shareware from Sloop Software, provides dialog-box access to many additional settings, including help-screen colors and drop-down-menu alignment. It also provides quick access to INI-file lines such as Shell= and Load=, More Control installs as a Control Panel icon, so it's easy to use. Download the file MORECN.ZIP from data library 3 (Utilities/Misc.).

HOTTIP.....DOS Hot Tips, page 293
You'll find macros and programs galore in our HOTTIP.ZIP file. VIEWER.REC and PRINTSCR.REC are Windows Recorder macros for viewing files and printing screens. MPAUSE.COM lets you use your mouse to continue scrolling after a PAUSE command. Want to scan for viruses on a certain day or move several DOS files at once into the same location? Then check out the batch files from this month's DOS Hot Tips. Download HOTTIP.ZIP from data library 1 (Hot Tips/Secrets).

DOSMAX.....DOS, page 292
Want a \$15 shareware product that makes the most of memory below 640K? DOSMAX moves much of DOS and its internal data structures to the upper-memory RAM created by EMM386.EXE or another memory manager. Download DOSMAX.ZIP from data library 3 (Utilities/Misc.).

Zip Code.....Software Secrets, page 316
Are you tired of having to search through cumbersome directories to find the zip code you need? To get the most out of this month's Microsoft Access Step by Step, use ZIPCOD.ZIP, a shareware database of all U.S. zip codes. ZIPCOD.ZIP, from Help Software, includes both a dBASE table of zip codes and the PCNOTES.TXT file, which describes how to use the database with Access. Download ZIPCOD.ZIP from data library 2 (Templates/Macros).

For how to join PC/Contact see page 330.

reordered. Maximize will consider all the unmarked programs and will load memory-hogging programs earlier in the load sequence if that helps to load more programs high.

DOS 6.0's memory-optimization utility, MemMaker, won't optimize the load order for you, but you can use information left by MemMaker to optimize the load order yourself. For information on this, see this month's DOS column, on page 292.

De Fastest Defrag?

I've started defragmenting my drive on a regular basis, but I'm frustrated that it takes so long. Would a disk cache speed the process?

MATT CORDELL
REDLANDS, CALIFORNIA

Disk optimizers have become much safer as the technology has matured, but it's still not a good idea to use a disk cache while defragmenting your disk. Given the low-level nature of the work a defragger does, you want the data to be read from and written back to the disk as directly as possible. Our advice? Simply schedule the defragmenting routine to run during off-hours.

That defragger speed is an issue raises the question of why you defrag so often. Typically, you shouldn't have to defrag more than once a month.

Piping and Redirection

Why do only some programs respond to redirection and piping on the DOS command line? For example, why can you redirect output from DOS commands such as DIR and CHKDSK to a file or printer, but not output from application programs such as WordPerfect?

HOMER B. TILTON
TUCSON, ARIZONA

The ability to redirect a program's I/O depends on whether the program uses DOS to perform its I/O. Some programs, like DOS's own commands, use programming services built into DOS to send text to the screen. Others use routines built into the BIOS, and some copy text directly to video memory, bypassing both DOS and the BIOS. You can redirect output from a program that uses DOS services, but redirection won't work with those that use the BIOS's text-output services or that

write directly to video memory. Similarly, you can pipe input to programs that use DOS services to get keyboard input, but you can't send input to programs that bypass DOS by reading characters directly from the keyboard. Applications frequently bypass DOS services so that their I/O routines will run faster—a technique that prevents any use of command-line redirection.

Rogue Filenames

My father was using WordPerfect 5.1 for DOS and saved a file with the name ROGER 1. I'm stuck with this file because, although I can see that it exists by using the DIR command or the Windows File Manager, I can't access, delete, or rename it. How can I delete this file?

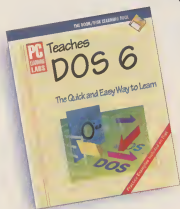
CAMILLE P. NG
MCLEAN, VIRGINIA

Your problem stems from DOS's inability to recognize spaces as valid characters in filenames, even though some programs let you create them with spaces. The DEL command doesn't work because it interprets a space character in a command as a delimiter separating adjacent command-line parameters, not as a character in a filename. If you type DEL ROGER 1.DOC, for instance, DOS will try to delete a file named ROGER and ignore 1.DOC because it did not understand that ROGER 1.DOC was supposed to be one parameter.

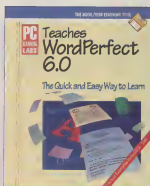
Here's how to get rid of that pesky file. On the command line, use DEL, substituting a question mark (the wildcard that DOS interprets as any character in a filename) for the space. If the name of the file is ROGER 1.DOC, type DEL ROGER1.DOC.

Do you need help using your computer? Q&A provides practical advice on PC problems. Questions are selected on the basis of broadest interest and may be edited for clarity and length. Sorry, but we cannot answer questions individually. Send your question, along with any screen printouts or other details that could help solve it, to Q&A, Help, PC/Computing, 950 Tower Lane, 20th Floor, Foster City, CA 94404. You can also reach us via CompuServe, on PC/Computing's PC/Contact online service. Send your comments or questions to 76000,21. ☐

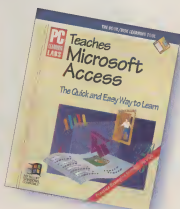
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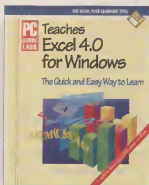
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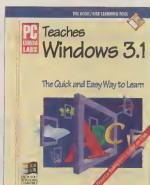
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For new subscribers, follow these steps:

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Or call CompuServe with your modem. Set up your modem and telecommunications package using 7 data bits, even parity, 1 stop bit, and full duplex, and call (800) 346-3247. When the modem connects, press Enter. When you see the HOST NAME prompt, type in PHONES and then hit Enter. Then just follow the onscreen menus and note the access phone number for your area.

3. Dial the local access number with a modem. When you connect to the network, press Ctrl-C to get its attention.
4. At the HOST NAME prompt, type CIS (which is the acronym of the CompuServe Information Service).
5. At the USER ID prompt, enter 177000,5300.
6. At the PASSWORD prompt, enter PC/CONTACT.
7. At the ENTER AGREEMENT NUMBER prompt, type Z100PCT.
8. If you have trouble, call the Customer Assistance Line at (800) 848-8990. After you follow the above procedures, the CIS system will provide you with your own user ID—called a PPN—and a temporary password. You can then log on and begin to explore PC/CONTACT. In about two weeks, you'll receive a letter from CIS confirming your PPN and providing you with a new password. You should then change your password by typing GO PASSWORD at any CIS prompt.

TOP PICKS ON DISK

You can easily get all the public-domain utilities or shareware covered in this month's issue by calling the disk vendor Public Brand Software at (800) 426-3475 or (317) 856-7571. Ask for this month's Editors' Picks from PC/Computing. They're available for \$5 or less per disk (most disks have several utilities and programs on them), plus \$5 for shipping and handling. Visa and MasterCard are accepted.

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LOOK FOR NETWORKING POWER IN ALL THE RIGHT PLACES WITH TIPS STRAIGHT FROM THE EXPERTS.

NETWORK UTILITIES

BUILD BRANCHING MENUS

Last month's Networking Smarter explained how to create menus with NetWare's menu-customizing utility. But when menus get too long, it's time to create submenus that branch to other applications or utilities.

To add a branching menu of disk-formatting options to an applications menu, enter these lines in a text editor, then save the file as APPS.MNU:

```
%Applications
WordPerfect 5.1
  C:\WP51\WP.EXE
Lotus 1-2-3 3.4
  C:\123R34\LOTUS.COM
Paradox 4.0
  C:\PDOX\PARADOX.EXE
Procomm
  C:\PCPLUS\PCPLUS.EXE
Format a Disk
  %Format a Disk
%Format a Disk
1. Format a 360K 5 1/4" Disk
  C:\DOS\FORMAT A: /F:360
2. Format a High Density
  5 1/4" Disk
  C:\DOS\FORMAT A:
3. Format a High Density
  3 1/2" Disk
  C:\DOS\FORMAT B: /F:720
4. Format a Medium Density
  3 1/2" Disk
  C:\DOS\FORMAT B:
```

Substitute the names of your own applications for the ones listed, and be sure to specify the appropriate path and program name.

To create a submenu, enter the name that you want it to appear as in the main menu—Format a Disk, in our example. Below that, enter the name of the new menu title, preceded by a percent sign (%). Remember that both the menu title and its command line must be exactly the same.

As an added bonus, NetWare's menus provide interactivity. You can include a fifth option in the Format a Disk menu to copy any file to any drive you specify by typing the following lines in APPS.MNU:

```
5. Copy a File
  NCOPY @1"Message" To
  @2"Destination Directory"
```

Add other interactive commands by placing your command, followed by @1, with the first prompt in quotation marks, and an @2 following the second prompt (which must also be in quotation marks).

For readability, group all submenus at the end of your menu file. Go to the end of the file, and enter the name of the submenu title followed by the appropriate commands.

To use the new menu, enter this command in the directory in which you saved APPS.MNU:

MENU APPS.MNU

JOHN TASCHKE
ASSOCIATE TECHNICAL EDITOR

MENUS A LA CARTE

You don't have to be logged in to your network to use NetWare menus. This undocumented tip lets you access NetWare's menu system from any standalone PC.

The first step is to create a directory on your local drive called MENU. Next, copy the following files from the SYS:PUBLC directory, which

is usually listed as Z:\PUBLIC, to the new MENU directory:

```
MENUPARZ.EXE
MENU.EXE
MENUPARZ.HLP
SYSSMSG.DAT
IBMSRUN.OVL
SYSSHLP.DAT
SYSSERR.DAT
```

These files take up less than 190K of hard disk space.

To use a menu, create one as described in the preceding tip and place it in the MENU directory. Add the new MENU directory to your DOS path so that you can run your menu from any directory.

Note: Don't create a menu item that runs Windows. NetWare's menu utility is a TSR known to cause conflicts with Windows.

JOHN TASCHKE
ASSOCIATE TECHNICAL EDITOR

NETWARE ADMINISTRATION

CLEAN SERVER BOOTS

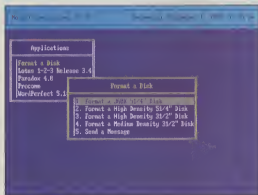
Problems getting your server up and running? Perhaps you added a new network card and can't get the server to run correctly. Check to see if the problem lies in your AUTOEXEC.NCF or STARTUO.NCF file—the configuration files that NetWare uses when loading SERVER.EXE.

In order to test your AUTOEXEC.NCF file for any problems, you need to know your server's name, its IPX address, and the information that it uses to bind the network drivers to the network card.

If your server is already running but spits out error messages when loading, you should examine the contents of AUTOEXEC.NCF from the INSTALL menu. To do so, type in LOAD INSTALL at the server prompt, select System Options, and then select Edit AUTOEXEC.NCF.

Once you have noted all the information in AUTOEXEC.NCF, press Esc to leave the menu, then shut down the server. Before entering DOWN at the server prompt, be sure to warn everyone that the server will be temporarily unavailable.

Now, type Exit at the prompt to



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return to DOS, then reload the server with this command:

SERVER -NA

NetWare prompts you for each item it needs to get the server running—such as network name and address. Step through the items, filling in the information. If one does

not load correctly, that's the culprit.

If you think that the problem is with your NetWare startup file—STARTUP.NCF—follow the same steps as above but use this command at the server prompt:

SERVER -NC

When your server boots normally,

make the changes permanent by adding them to the appropriate configuration file.

JOHN TASCHKE
ASSOCIATE TECHNICAL EDITOR

GAUGE SERVER CPU HIT

NetWare 3.11's MONITOR command shows many network statistics, but it doesn't show the toll each network process takes on the performance of the server CPU. Try this undocumented command to get a new MONITOR menu option, called Processor Utilization, to show the breakdown of CPU usage by process.

At the server prompt, enter the following command to load MONITOR with the new option enabled:

LOAD MONITOR -P

The Processor Utilization option appears at the bottom of the menu. When you select it, a menu called Available Processes and Interrupts appears. From the menu, select the item you want to view—for example, the Cache Update Process or the Directory Cache Process. These determine the percentage of CPU time spent allocating server memory during disk access.

Be sure to check out the Hot Fix Process option, too. If you suspect that a network drive is going bad, consult Hot Fix's real-time statistics to gauge the CPU time spent moving bad files into the Hot Fix area.

JOHN TASCHKE
ASSOCIATE TECHNICAL EDITOR

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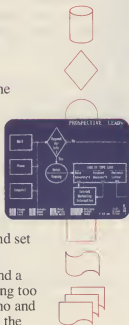
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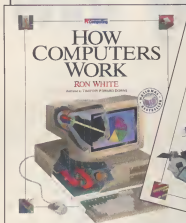
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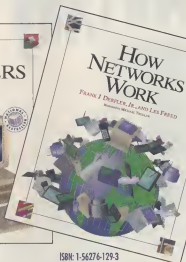


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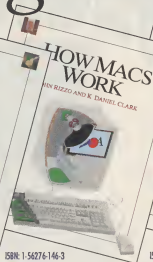
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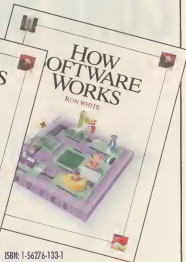
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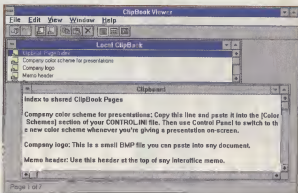
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You can't buy smart without a scorecard, especially when shopping by mail. Learn the vital statistics first, and score a productivity home run.

You must be getting dizzy. Every quarter, every month, it seems new products hit the market that virtually redefine the standards of usefulness and performance. How you choose computing products today will dramatically impact your company's productivity—and its bottom line.

Gleaned from interviews with practically every major computer vendor and marketer—and combined with our impartial expertise—Spec Watch provides up-to-the-minute advice for shrewd, forward-looking purchase decisions: decisions that keep one eye on the bouncing ball of the product standards currently swamping the computer industry, and the other on future needs.

To ensure that you buy properly, consult our minimum specs on the following pages. Don't be lulled into false bargains—if you don't pay now you'll certainly pay later.

This issue, Spec Watch focuses on 15 hardware categories. In future issues, we'll add software, networking tools, and more hardware. And because new products constantly raise the bar for acceptable performance and usability, *PC/Computing* will reexamine and update Spec Watch each month to keep you current on every product development.

By Winn Rosch and the PC/Computing Staff



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WHETHER IT'S ONE of 50 new PCs added to your network or a new upgrade, today's desktop Windows engine needs more power to stave off obsolescence.

A 66MHz 486DX2 costs only a bit more than systems powered by lesser CPUs, but its performance outclasses all but Intel's Pentium CPU for most applications. From a technological perspective, settling for anything less will mean a shorter useful product life. The return for buying

more than a 486DX2/66 now probably won't justify the extra expense. A Pentium-compatible upgrade socket is all the Pentium you need right now for a desktop PC.

Windows' graphical screens demand the fastest video you

can get—VESA local-bus and a VL-Bus graphics accelerator card powered by a chip like the S3 86C801, IIT AGX014, Western Digital WD90C31, Cirrus Logic CL-GD5426, or ATI 68800 (Mach 32).

Don't settle for less than 8MB of RAM on the motherboard, and if you're considering OS/2 or Windows NT, opt for 16MB. The current best buys in hard disks are in the

210MB-to-240MB range, but look for change in the very near future. If you want to buy more in order to avoid upgrading later, consider a 500MB SCSI-2 drive.

Regardless, demand at least these specifications on any desktop PC: FCC Class B certification, two serial ports and one parallel port, a 101-key keyboard, a mouse, DOS 6.0, Windows 3.1, and documentation on all of your system's subcomponents, such as the display, video card, hard drive, and hard drive controller.



Slots: For a full-size case, eight ISA slots total, including two VL-Bus slots. For small-footprint PCs, three vacant ISA slots with integrated local-bus video and hard drive controller.

RAM: 8MB expandable to 32MB; 36-bit SIMMs.

CPU: Intel 486DX2/66.
CPU RAM cache: 256K four-way set-associative.

Hard drive: 230MB or larger IDE.

Video card and display: VL-Bus Windows accelerator and display that support a 72Hz vertical refresh rate at 1,024-by-768 resolution with 256 simultaneous colors.

Drive bays: Five half-height 5¼-inch bays (three with front-panel access) one 3½-inch 1.44MB floppy drive, and one 5¼-inch 1.2MB floppy drive.

Red flags: Avoid upgrade sockets that aren't Pentium ready, direct-mapped caches, ST506 and ESDI hard disks, BIOS's dated before 9/28/92, and Micro Channel and proprietary local-bus slots.

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CD ROM Drives

Transfer rate: Dual-speed drive: 150 Kps to 300 Kps.

Access time: 500ms (400ms for MPC Level II).

Ondrive cache: 64K.

Interface: SCSI.

Compatibility:

High Sierra (data), CompactDisc (audio), and PhotoCD (still photography) with multisession support.

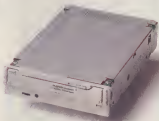
Audio: Output jack and volume control.

Packaging: Internal.

Features and options: Bundled CD ROM disks, single-handed operation.

Other requirements: Disk caddy (if needed).

Red flags: Avoid proprietary interfaces and drives that aren't MPC or MPC Level II compatible; faster CD XA CD-ROM technology will debut soon.



Sound Cards

Compatibility: Sound Blaster.

Mode: Stereo.

Card type: Internal.

Sampling capability: 16-bit record and play (MPC II standard).

Maximum sampling rate: 44.1KHz.

Synthesizer: Wave or FM with Wave option.

Bundled software: Windows and DOS utilities for playing, recording, and editing digital and MIDI files.

Ports: Speaker, microphone, and joystick.

Features and options: Onboard digital signal processor for compression and processing, SCSI port for a CD-ROM drive.

Red flags: Avoid cards that play but can't record 16-bit sound; avoid proprietary (non-SCSI) CD-ROM interface.



Subnotebook PCs

CPU: 20MHz 386.

Display type: 7.5-inch backlit passive- or active-matrix LCD.

Weight: Under 4 pounds.

Size: Under 8½ by 11 inches.

Keyboard: 85 percent of full-size keyboard.

RAM: 4MB expandable to 16MB.

Hard drive: 40MB.

Features and options: Removable hard drive, high-speed internal fax modem, integrated pointing device, infrared keyboard connection.

Other requirements: External floppy, at least one Type II PCMCIA slot, small recharger (5½ by 3 by 1½ inches).

Red flags: Subnotebook displays and keyboards entail compromise—try before you buy, or make sure there's a money-back guarantee with no restocking charge.



Notebook PCs

CPU: 25MHz 486.

Display type: 9½-inch or larger backlit passive-matrix monochrome LCD; color or monochrome active-matrix preferred.

Weight: Under 6 pounds for mono, under 7 pounds for color; battery charger under 1 pound.

Size: Smaller than 10 by 12 by 2 inches.

RAM: 8MB expandable to 20MB.

Hard drive: 120MB.

Ports/slots: Parallel, 9-pin serial, PS/2, one PCMCIA Type III slot or two Type II slots.

Features and options: Ability to swap out floppy drive for second battery, removable hard drive, user-installable RAM, integrated pointing device.

Other requirements: Standby mode, pop-up battery gauge, 6-by-3-by-3-inch battery recharger.



Network Servers

CPU: Intel Pentium, 486DX2/66, or 486DX/50.

RAM: 16MB expandable to 64MB.

CPU RAM cache: 256K.

Display: 14-inch Super VGA color or monochrome.

Videa card: Super VGA with 512K of RAM.

Hard drive: 1GB SCSI-2.

Drive bays: Two full-height 5¼-inch, two half-height 5¼-inch with front-panel access, and two 3½-inch bays.

Bus: Eight EISA slots, including two VL-Bus slots.

Features and options: RAID-5, DAT backup, UPS, local-bus hard drive controller.

Other requirements: FCC Class A or better, UL listed.

Red flags: Avoid ISA bus, slotted RAM, machines without CPU upgrade sockets, 80ns or slower RAM.



Windows Displays

Size: 17 inches; 21 inches for graphics apps.

Resolutions: 1,024 by 768; 1,280 by 1,024 for 21-inch monitors; noninterlaced.

Dot pitch: 0.28mm for 17-inch monitors; 0.31mm for 21-inch.

Vertical refresh rate: 72Hz at all resolutions.

Tube type: Flat-square or Trinitron.

Controls: Front-panel digital image controls.

Features and options: Support for MPR-2 low-emission standards; microprocessor-based controls for image-setting storage; BNC-5 and Mac connectors.

Other requirements: Adjustable tilt-and-swivel base, video cable, antiglare coating or add-on filter.

Red flags: Avoid monitors with dot pitch greater than 0.3mm, limited or inaccessible controls, actual image areas one inch smaller or more than listed size; avoid reconditioned (used) units.



Windows Accelerator Cards

Resolutions: 1,024 by 768; 1,280 by 1,024 for 20-inch monitors.

Colors: 256 colors at 1,024-by-768 resolution for business apps; 65,000 colors at 1,024 by 768 for near-photo-quality images.

Accelerator chip: Fixed-function chip such as S3 86C801, IIT AGX014, or ATI 68800 (Mach 32).

Vertical refresh rates: 72Hz at all resolutions.

RAM: 1MB for 256 colors at 1,024 by 768; 2MB or more for higher resolutions and more colors.

Features and options: VL-Bus model option, Windows utility to switch resolutions and colors.

Other requirements: Driver installation software, two-year warranty, Windows 3.1 drivers, free driver updates via BBS, CompuServe, or mail.

Red flags: Avoid interlacing and boards that support only 70Hz vertical refresh rates.



24-Bit Color Cards

Resolutions: 1,024 by 768 or higher.

Colors: 16.7 million colors at 1,024-by-768 or 1,152-by-870 resolution.

Graphics processor: For 24-bit Windows applications, a fixed-function processor; for 24-bit DOS apps, a full-fledged graphics coprocessor (TI34020 chip).

RAM: 4MB.

Vertical refresh rates: 72Hz at all resolutions.

Drivers: For Windows 3.1 and your specific DOS apps.

VGA support: Onboard VGA chip.

Features and options: VL-Bus or EISA model option, Windows utility to switch resolutions and colors.

Other requirements: Two-year warranty, free driver updates via CompuServe, BBS, or mail.



Don't settle for less than these specs:

High-Speed Fax Modems

Transmission rate: 14,400 bps without compression; 57,600 bps with it.

Supported standards: V.32bis (data speed), V.42 (error correction), V.42bis (data compression), CCITT Group 3 Class 1, Class 2, and CAS (fax).

Packaging: Internal preferred, but external to save a slot and simplify portability between PCs.

Compatibility: Hayes.

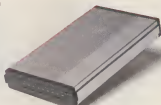
Port selection: COM1 through COM4.

Bundled software: DOS and Windows communications and fax software.

Features and options: Bundled OCR software, serial cable.

Other requirements: Modular phone cable.

Red flags: *Avoid models without fallback transmission-rate capabilities.*



Ethernet Network Adapters

Card type: 16 bit; ability to auto-configure to 8 bit.

Network support: NetWare, LAN Manager, LAN Server, Windows for Workgroups, and Windows NT.

Drivers: Eagle NE2000-compatible drivers, support for NDIS and ODI drivers.

Media connectors: For 10Base-5 (Thicknet), 10Base-2 (Thinnet), and 10Base-T (RJ-45); automatic sensing of media configuration.

Installation: Should be software configurable and support interrupt levels above IRQ 7.

Features and options: Upgradable boot PROM; SNMP support; polarity, collision, and link status LEDs; bus-mastering interface.

Other requirements: Diagnostic utilities, slot-bracket-mounted transmission and reception LEDs, 16K or larger buffer.



Desktop Laser Printers

Emulations: PCL 5, PostScript option (with automatic emulation sensing and all ports active).

Print engine speed: 8 ppm.

Resolution: 600 dpi.

Resident fonts: 45 total; 10 TrueType fonts (matching Windows 3.1).

RAM: At least 2MB.

Interface: Bidirectional parallel.

Paper capacity: 200 sheets.

Footprint: 260 square inches or less.

Features and options: HP-compatible font cartridges and slots, RISC processor for 600-dpi printers.

Other requirements: Toner cartridge, parallel cable.

Red flags: *Toner should be included; avoid proprietary cartridge slots.*



Color Thermal Transfer Printers

Emulations: PostScript Level 2.

Print speed: 1 ppm.

Resolution: 300 dpi.

Processor: 16MHz RISC.

Printer language: PostScript Level 2.

RAM: 4MB.

Interface: Parallel.

Fonts: 35 Adobe Type 1.

Ribbon: Three-color transfer ribbon.

Features and options: Internal network interfaces, support for four-color (three-color plus black) ribbons.

Other requirements: RAM expandable to 8MB, network interfaces.

Red flags: *Be sure vendor provides a PostScript Level 2 driver, despite some claims, business-quality printing on plain copier paper isn't a reality yet.*



Network Laser Printers

Emulations: PCL 5 and PostScript Level 2 with automatic emulation switching.

Print engine speed: 20 ppm.

Resolution: 600 dpi.

Processor: 16MHz RISC.

Resident fonts: 90 (45 PCL 5, 35 PostScript), plus 10 TrueType (matching Windows 3.1).

RAM: 8MB.

Interfaces: Parallel and 10Base-T or 10Base-2 Ethernet, Token-Ring, or LocalTalk.

Network support: Concurrent support of Novell NetWare, Windows NT, Windows for Workgroups, LAN Manager, and LAN Server.

Paper capacity: 1,000 sheets.

Warranty: One year with onsite service.

Features and options: Support for SNMP.



Single-User Tape Drives

Storage capacity: 250MB when compressed.

Packaging: Internal 3½-inch drive preferred; external for PC-to-PC portability.

Interface: Floppy drive, IDE, or SCSI.

Cartridge type: DC6525 or equivalent, preformatted.

Bundled software: Windows and DOS backup software that supports either QIC 80 or QIC 525 tape format.

Other requirements: Floppy interface splitter or other interface cable, mounting hardware for internal drives.

Red flags: *Ensure full QIC 80 compatibility for QIC drives; avoid proprietary controller cards; avoid paying more than a dollar per megabyte of compressed storage capacity.*



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Our fax modem feature will reveal everything business buyers need to know to get the right communications hardware and software for their specific needs. Plus, we'll include a range of insightful editorial features that have made PC/Computing the choice for Business Solutions Buyers.

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| T2000SX/G2200SX/T1800, 1850, C | 4Wkg | PC-PA2007U | 159.00 |
| T2000SX/G2200SX/T1800, 1850, C | 8Wkg | PC-PA2002U | 279.00 |
| T4400SX, SKC T6430 | 4Wkg | PC-PA2004U | 164.00 |
| T4400SX, SKC T6430 | 8Wkg | PC-PA2005U | 299.00 |

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|------------------------------------|-------|------------|
| SBC, TS400 | 32Meg | N/A |
| 300C, T4600, T1900, T1900C (3.3 v) | 4Meg | PC-PA2012U |
| 300C, T4600, T1900, T1900C (3.3 v) | 8Meg | PC-PA2013U |
| 300C, T4600, T1900, T1900C (3.3 v) | 16Meg | PC-PA2014U |

| Model | Frequency | Power | Price |
|---------|-----------|-------|--------|
| T3300SL | 1.40GHz | 45W | 169.00 |
| T3300SL | 1.40GHz | 45W | 229.00 |
| T3300SL | 1.40GHz | 45W | N/A |
| T3300SL | 1.40GHz | 45W | 749.00 |
| T1200XE | 2.40GHz | 65W | 85.00 |
| T1800 | 2.40GHz | 65W | 55.00 |
| T3190 | 2.40GHz | 65W | 129.00 |
| T3190X | 2.40GHz | 65W | 55.00 |
| T3106SK | 2.40GHz | 65W | 85.00 |
| T3200 | 3.40GHz | 95W | 164.00 |
| T3200 | 3.40GHz | 95W | 159.00 |

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| 1Meg | PC12-PA8800 |
| 4Meg | PC12-PA8800 |
| 8Meg | PC19-PA8310U |

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|------------|------|--------------|--------|
| T3200SX | 4Meg | PC19-PA8319U | 194.00 |
| T5100 | 2Meg | PC7-PA8301U | 89.00 |
| T3200T8500 | 2Meg | PC10-PA8304U | 89.00 |
| T5000T8500 | 8Meg | PC10-PA8313U | 299.00 |

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|-----------------------------|-------|------------|---------|
| AS1 Notebook Power Exec | 4Mtg | 500814-003 | 146.00 |
| AS65SA/20/25/2SL | | | |
| AST Power Exec 3/25C, 425EL | 4Mtg | | 179.00 |
| AST Power Exec 425SL | 4Mtg | | 248.00 |
| AST Power Exec 425SL | 16Mtg | | 1319.00 |
| AT&T Safari NSX/20 | 4Mtg | PEC 37651 | 189.00 |

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| ES10W, SX | 4Meg | |
| 43 | 4Meg | A00511 |

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|-----------------------|-----|-----------------|--------|
| Eventx Tempo LX, LX20 | 2Mg | PCA 00053-0001 | 89.00 |
| Eventx Tempo Carrier | 2Mg | PWA 0834-A-1000 | 118.00 |

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|------------------|------------|-----------|---|
| Type 0.1.T 386SX | 1Meg | 204,386SX | 9 |
| x Metals | 1Meg, 4Meg | | |

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|---------------------------|------|----------------|--------|
| MCR 3170 | 8MM | | 519.00 |
| MCR 3170 | 16MM | 3123-K116-V001 | 923.00 |
| MCR Prospeed 296 | 1MM | P121-21 | 100.00 |
| MCR Prospeed 296 | 2MM | P121-22 | 100.00 |
| MCR Prospeed 399 | 2MM | P121-21 | 124.00 |
| MCR Prospeed 399 | 8MM | P121-22 | 359.00 |
| MCR Prospeed 390SX-20 | 1MM | P043-21 | 103.00 |
| MCR Prospeed 390SX-20 | 4MM | P043-22 | 103.00 |
| MCR Prospeed 390SX-20 25C | 2MM | P047-21 | 119.00 |
| MCR Ultraline 115/25C | 4MM | P047-22 | 219.00 |
| MCR Ultraline 115/20 20P | 8MM | P047-21 | 284.00 |
| MCR Ultraline 115/25C | 8MM | P047-22 | 284.00 |
| 4 MacMac/115C | | | 299.00 |

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|---------------------|------|------------|
| CF170, CF270, CF370 | 10MB | CF-54185 |
| 716 MB | 29MB | M3D-W6MEM2 |
| 81, 885, 8785 | 29MB | 52 |

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|-----------------------------|-------------|--------------|-----------------|
| Sharp PC-6220 | 1Meg | CE 6210 | 89.00 |
| Tandon, PC Brand, Dataworld | 2Meg, 8Meg | N3280SX-20 | 89.00, 499.00 |
| Ti Travelmate 2000 | 1Meg | 2560334-0301 | 85.00 |
| Ti Travelmate 3000 | 2Meg | 2568396-1 | 79.00 |
| Ti 4000 | 4Meg, 16Meg | | 199.00, 1599.00 |

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| 480, 480SX, 1X | 4Meg/16Meg | 19 |
| SX Notebook | 2Meg | |

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|-----------------------------|------|-----------|---------|
| Zenth Master Sport 286SX | 2Meg | 2A-300-1 | \$99.00 |
| Zenth Master Sport SL, SLE | 2Meg | 2A-4-4 | \$99.00 |
| Zenth Super Sport 286, 286E | 1Meg | 2A-180-88 | \$99.00 |
| 286E, SX | 2Meg | 2A-180-64 | 109.00 |
| SX Alpha | 2Meg | 2A-180-88 | 109.00 |

USER PRINTER MEMORY UPGRADE

| AMOUNT UPGRADER | 04 (2) | 2500 | 1 | 2 | 3 | 3.5 | 4 | 5 | 6 | 8 | 16 | 32 |
|--------------------------|--------|------|-----|---|---|-----|-----|---|-----|---|----|----|
| Canon LBP-450 | - | 119 | 169 | - | - | - | - | - | - | - | - | - |
| Canon LBP-45X | - | 89 | 249 | - | - | - | - | - | - | - | - | - |
| Compaq PageSmart | - | 69 | 99 | - | - | - | - | - | 299 | - | - | - |
| Epson 8000, Action Laser | - | 115 | - | - | - | 179 | - | - | - | - | - | - |
| Epson Action Laser II | - | 90 | 169 | - | - | - | 249 | - | - | - | - | - |
| Epson 8000 | - | 90 | 169 | - | - | - | 249 | - | - | - | - | - |

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| 3, 3D, 3P, 3P2P+ | - | - | 88 | - | - | 158 | - | - |
| 4S, 4SMX | - | - | 80 | - | - | 149 | - | - |

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|-----------------------------|-----|----|-----|----|---|-----|---|-----|-----|---|
| HP 351 | - | - | 48 | - | - | 139 | - | 309 | - | - |
| HP 451 | - | - | - | 60 | - | 149 | - | 309 | - | - |
| HP DesignJet 500, 500C, 550 | - | 55 | - | - | - | - | - | - | - | - |
| HP DesignJet 1200C, 1200C/P | - | - | 120 | - | - | 209 | - | 399 | - | - |
| HP PaintJet XL 500 | 100 | - | - | - | - | 268 | - | - | 745 | - |
| IBM Laser 4010, 4010E | - | - | - | - | - | 144 | - | - | - | - |

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| 4339 | - | - | - | - | - | 152 | - | - |
| 4339 | - | - | - | - | - | 169 | - | - |
| 230 | - | - | - | 109 | - | - | - | - |

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| 08 400 | - | - | - | - | - | - | - | - | - |
| 08 820 840 | - | - | - | - | - | - | - | - | - |

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| 901 PB 9530 | = | = | = | 115 | = | = | 119 | = | = |
| 902 442D044501 | = | = | = | 119 | = | = | 189 | = | = |
| 903 441D04430 | = | = | = | 109 | = | = | 189 | = | = |

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| Pallasonic 4450 | - | - | 99 | - | - | - | - | - |
| Star LSQ4 | - | - | 109 | 159 | - | - | 249 | - |
| Texas Instruments | - | - | 40 | - | - | - | - | - |

P. COMPATIBLE FONT CARTRIDGE

| | |
|--|--------|
| BAR CODES Bar Code Reader Fonts | 99.00 |
| RESJET SOLUTION for Cakt 500 & Plus, 92 Fonts, 4 1/2 pt-30 pt. | 99.00 |
| IBM 4810, 4819, FONT CARTRIDGE 256 Fonts, Turbo Card | 125.00 |

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| TAX & FINANCE FOR IBM 4810, 4816E, 4820 | 129.00 |
| TAX & FINANCE CARTRIDGE | 84.00 |
| Q92 405, 888 41 fonts, 11 typesets | 169.00 |

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|-----------------|------|------------|
| Book Press Exec | 4Mw2 | 12437360 |
| | 4Mw2 | 500814-003 |

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|-------------------------|------|---------|--------|
| Goldstar G5820 386SX/16 | 4Meg | 5389-49 | 239.00 |
| Leading Edge OLT 386SX | 1Meg | | 109.00 |

41840 3123-K104-V001

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|-------------------------------|--------------------|---------|-------------|
| MEC Prospekt 206, 366SX-16 | 1Mio | PC21-21 | 105,00 |
| NUP Prospekt 206, 366SX-16 | 4Mio | PC21-22 | 174,00 |
| MEC Prospekt 366 | 2Mio | PC21-21 | 124,00 |
| MEC Prospekt 366 | 8Mio | PC21-22 | 359,00 |
| MEC Prospekt 366SX-20 | 1Mio | PC43-21 | 103,00 |
| MEC Prospekt 366SX-20 | 4Mio | PC43-22 | 199,00 |
| MEC Ultraline II120, 20P, 25C | 4Mio | PC47-21 | 119,00 |
| MEC Ultraline II15, 25C | 4Mio | PC47-22 | 219,00 |
| MEC Ultraline SL20, 20P | 6Mio | PC47-21 | 269,00 |
| MEC Ultraline II25C | 6Mio | PC47-22 | 349,00 |
| MEC Ultraline V150 | 4 Mio/8 Mio/16 Mio | | 229/427/709 |

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|---------------------|------|------------|
| CF170, CF270, CF370 | 10MB | CF-54185 |
| 716 MB | 29MB | M3D-W6MEM2 |
| 81, 885, 8785 | 29MB | 4MB |

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|------------------------------|------|-------------|-----------------|
| Sharp PC-8250 | 1M4 | PC 6210 | 89.00 |
| Taylor, P. C. Singapore | 2M6g | 8914 | 89.00 |
| T. Transmille 2000 | 1M6g | 256181A-001 | 79.00 |
| T. Transmille 3000 | 1M6g | 256999-01 | 79.00 |
| T. 4000 | 4M6g | 12M6g | 199.00, 1559.00 |
| Tennetech, And. Computelyne | 4M6g | 12M6g | 199.00, 1559.00 |
| Tenue 400, 400S, IX | 4M6g | 12M6g | 199.00, 1559.00 |
| Zee 3653A/4M6g | 4M6g | 12M6g | 199.00, 1559.00 |
| Zenith Master Sport 386SX | 2M6g | ZA-300-1 | 89.00 |
| Zenith Master Sport SL, SLE | 2M6g | ZA-4-4 | 89.00 |
| Zenith Sport Sport 286, 286E | 1M6g | ZA-180-86 | 109.00 |
| 286, SX | 1M6g | ZA-180-86 | 109.00 |
| SX 386A | 1M6g | ZA-180-86 | 109.00 |

SEP. PRINTED MEMORY UPGRADE

| AMOUNT UPGRADED | UX 04 | 230k | 1 | 2 | 3 | 3.5 | 4 | 5 | 6 | 8 | 16 | 32 |
|--------------------------|-------|------|-----|-----|---|-----|-----|-----|---|-----|----|----|
| Canon LBP4 4.1/4r, 4/4r | - | 119 | 168 | | | | | | | | | |
| Canon LBP45X | - | 89 | 249 | | | | | | | | | |
| Compaq PaperMater | - | 89 | 99 | | | | 169 | | | 239 | | |
| Epson 5000, Action Laser | - | 115 | | | | | 179 | | | | | |
| Epson Action Laser II | - | 80 | | 169 | | | | 249 | | | | |
| Epson 5000 | - | 90 | | 169 | | | | 249 | | | | |

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| 3-PC RAM Cards ZMEB | 238.00 | 9600/9600 Data/Fax Modems |
| Card Pro (made by Data V.I.) | | 2450/9600 Data/Fax Modems |
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| BAR CODES Bar Code Reader Fonts | 96.00 |
| BERKLEY SYSTEM for Citi 500 & Plus, 96 Fonts, 4 1/2 x 3-30 pt. | 89.00 |
| IBM 4816, IBM, PC/XT, COMPATIBLE 256 Fonts, 2-1/2 x 3 Card | 135.00 |
| TURBO 25 Compatible to Pacific Data's 25 CARTRIDGES. In ONE!™ - 42 | |
| Fonts (formal, with Eikon Action Laser II and all HP Printers except HP II) | 79.00 |
| TURBOSCRIPT™ 42 256 Fonts, 256 Fonts, 256 Fonts (HP 2, 20 - 158) | 149.00 |
| TURBOSCRIPT™ 106, 108 Scale Fonts, 256 Fonts, Any Point Size (HP 2 - 160) | 179.00 |
| TAX & FINANCE FOR IBM 4816, 4816, 4022 | 139.00 |
| TAX & FINANCE CARTRIDGE | 84.00 |
| QWERTY, 888 41 Fonts, 11 styles | 169.00 |

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NEC

NEC 3D Color Monitor '359

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|----------------|--------|----------------|--------|
| 15" 3Fge | \$699 | NEC OEM* | |
| 15" 4Fge | \$699 | Monitors | |
| 15" 6Fge | \$1069 | | |
| 17" 6F | \$1249 | 17" 5Fge | \$1129 |
| 21" 6F | \$2779 | | |

SAMSUNG

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|-----------------------------|-------|
| 14" CVL4955 | \$219 |
| 14" SyncMaster 2 | \$249 |
| 14" SyncMaster 3n | \$279 |
| 14" SyncMaster 3n | \$279 |
| 15" SyncMaster 15C | \$449 |
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FLEX VISION

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| 15" 1024X768 | \$289 |
| 15" 1024X1024 | \$429 |

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| 14" 9439R | \$229 |
| 14" 9468R | \$269 |
| 14" CPS 1461LR | \$309 |
| 15" CPS1561 | \$389 |
| 15" CPS 1560LR | \$429 |
| 17" CPS 1760 ProScan | \$799 |

MAG

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|-----------------|-------|
| 14" | \$319 |
| 15" MX15F | \$549 |
| 17" MX17F | \$949 |

HITACHI SuperScan™

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| 15" | \$499 |
| 17" | \$649 |
| 20"/Pro20™ | \$1399 |
| Pro21™ | \$2199 |

SONY

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|---------------------|--------|
| 14" CPD-1320 | \$339 |
| 17" CPD-1304S | \$499 |
| 17" CPD-1604S | \$949 |
| 20" GDM-2036S | \$2099 |

LAPTOPS

TOSHIBA

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|--|----------------------|
| T1900, i486SX+20, 80MB | \$1599 |
| T1900, i486SX+20 | \$1729/\$1979 |
| T1900C, i486SX+20 | \$2389/\$2649 |
| T4500*, i486SX+20 | \$1829/\$1999/\$2329 |
| T4500C*, i486SX+20, Active Color | \$2899/\$3149 |
| T4600, i486SL+33 | \$2799/\$3049 |
| T4600C, i486SL+33 | \$3499/\$3749 |
| T4600C, i486SX+33, 340MB, i486 | \$4699 |
| T6600C*, i486DX+266, 510MB | \$6399 |
| T6600C, CD*, i486DX266, 510MB | \$6899 |
| T6600C, CD*, i486DX266, 510MB | \$7999 |

*AC power only

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| TravelMate 4000 | \$1489 |
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| 120MB | \$2589 |
| WinDX/25 4MB | \$2089 |
| 200MB | \$2249 |
| WinDX2/40 Color + 8MB | \$3589 |
| 200MB | \$3589 |
| WinDX2/50 | \$2649 |
| 200MB, 4MB | \$2989 |
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| JUMBO 120 120MB storage capacity | \$239 |
| INT. SYSTEM/149 | \$239 |
| INT. SYSTEM/173 EXT. SYSTEM/269 | \$269 |
| JUMBO TRAKKER 120MB | \$289 |
| JUMBO TRAKKER 250MB | \$349 |
| POWERTAPE™ | \$949 |
| 2GB INT./EXT. | \$1089 |
| 4GB INT./EXT. | \$1489 |

DATA CARTRIDGES

3M

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|--------------------------------|-------------|
| DC2000 40/80MB | \$15.95 ea. |
| DC2060 Thetamark (QC-40) | \$29.95 ea. |
| DC2080 80/160MB | \$19.95 ea. |
| DC2080 Rhomark (I-80) | \$22.95 ea. |
| DC2120 120/250MB | \$21.95 ea. |
| DC2120 Ximat (QC-80) | \$25.95 ea. |
| DC1850 250/500MB | \$21.49 ea. |
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COMPAQ

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| DESKPRO 4/25s from | \$1,329 |
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| DESKPRO 4/66i from | \$2,119 |
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| DESKPRO 486s/25M from | \$1,839 |
| Contura 3/25C from | \$1,979 |
| DESKPRO 486/33M from | \$2,139 |
| DESKPRO 50M from | \$2,379 |
| DESKPRO 66M from | \$2,999 |
| Contura 3/25 from | \$1,449 |
| Contura 3/25C from | \$1,979 |
| Contura 4/25 from | \$2,179 |
| Contura 4/25 CX Color from | \$3,439 |
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| LTE Lite/25E from | \$2,529 |

Call Your Sales Representative for details.

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|-------------------------------------|---------|
| Video Graphics Color, 14" | \$199 |
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| QVision 150 Color, 15" | \$689 |
| QVision 170 Color, 17" | \$1,039 |

SPEEDSTAR PRO 1MB ISA/VLB

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| STEALTH PRO VLB | \$119/\$129 |
| 2MB | \$349 |
| VIPER VLB 2MB | \$409 |

GRAPHICS ULTRA+

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|---------------------------|-------------|
| 1MB/2MB | \$219/\$249 |
| GRAPHICS ULTRA+ PRO | \$249 |
| 2MB ISA/VLB/EISA | \$369/\$399 |

ORCHID

| | |
|----------------------------|-------|
| ProDesigner II/s 1MB | \$149 |
| Fahrenheit 1280+ 1MB | \$179 |
| Fahrenheit VA 1MB | \$179 |
| ISA/VLB | \$199 |
| Celsius VLB 1MB | \$279 |

MODEMS

Hayes

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|----------------------------|-------------|
| Int./Ext. | \$65/\$75 |
| ACCURA 2400 | \$209/\$229 |
| ACCURA 144+ FAX34 | \$239/\$259 |
| POCKET EDITION™ 2400 | \$119 |

Robotics

| | |
|--------------------------|-------------|
| Int./Ext. | \$169/\$179 |
| Sportster 9600 FAX | \$189/\$209 |

FLEX ultimate

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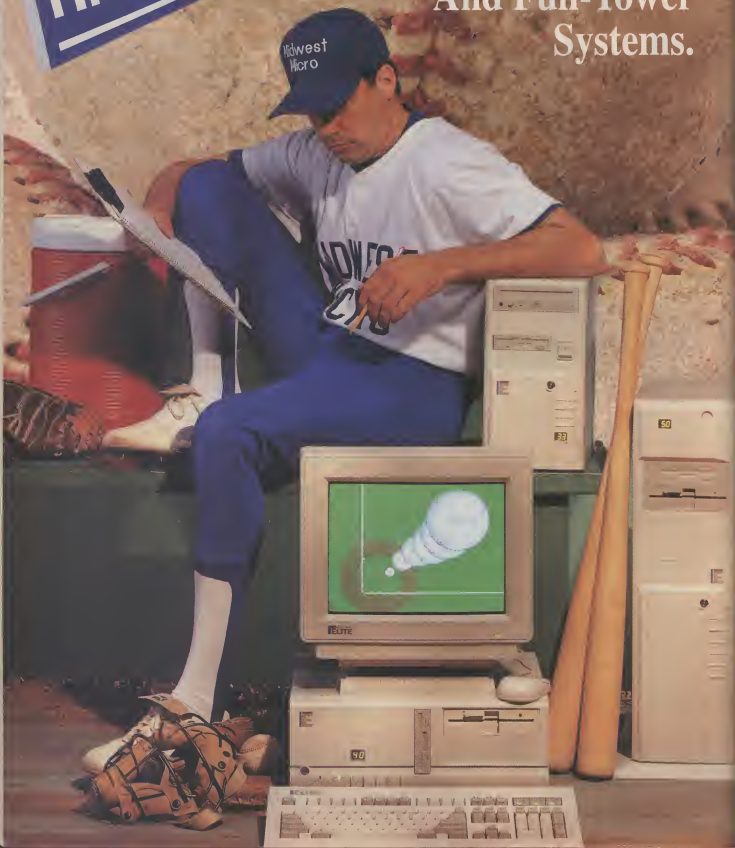
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MidWest Micro

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Systems.



MidWest Micro—Known For Our Hard-Hitting Products

At MidWest Micro, we build products that last—like Elite Computer Systems. But that's really no surprise. After all, the Midwest is where professional baseball began...and where Louisville Sluggers are made.

Our manager knows a team is only as strong as its weakest player. So, just as Louisville Sluggers are made from the choicest woods, Elite Computers are constructed from the finest components. Each Elite System is custom designed and engineered for superior performance and reliability.

First we select durable cases to hold and protect our Elite Systems. Then we add the fastest motherboards, the most reliable hard drives and the highest-resolution monitors.

Your Chance For A Steal

With Elite Systems, you have the hometown advantage. Elite Computers are assembled on-site to eliminate double handling costs and ensure strict quality control. Elite Systems come with SVGA cards, high-speed RAM boards, 3.5" floppy drives, formatted hard drives and Microsoft DOS 6.0 and Microsoft Windows* installed. When your Elite arrives, it's ready to go. Simply open the box—plug it in—and start computing.

At MidWest Micro You're Never Out

You're always a winner with MidWest Micro. Each Elite System comes backed by a 30-Day Complete Satisfaction Guarantee, a Full-Year Limited Warranty, an Immediate Parts Replacement Policy and 72-Hour Repair Service. And since all Elite Systems are repaired on the premises, you're guaranteed the fastest turn around time and best service available.

Fielder's Choice

Each Elite Computer comes with a number of options so you'll never outgrow your system. For details on our complete line of hard drives, monitors, tape backups, memory upgrades, modems, printers and more, call your MidWest Micro Representative at 1-800-572-8844.

Fast Delivery

You'll need a radar gun to clock our fast delivery. Most standard configurations are shipped within 24 hours. If you'd prefer a custom configuration, we'll do our best to have it on your doorstep within 72 hours.

**Some configurations do not ship with Windows.*

The Major Leagues

Deluxe ISA Systems

486DX-33 \$1369

#003360

- Statistics:**
- 80486DX-33 Processor
 - 128K High-Speed Cache
 - 4 Mb High-Speed RAM
 - 130 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - 1.2 Mb 5.25" Floppy Drive
 - 14" SVGA, 28 Non-Interlaced Color Monitor
 - 16-Bit SVGA Card with 1 Mb
 - 1 Parallel, 2 Serial & 1 Game Port
 - 101-Key Enhanced Keyboard
 - High-Resolution, 3-Button Mouse
 - 5-Bay Mini-Tower Case
 - FREE Microsoft DOS 6.0 Installed
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486DX2-50 \$1479

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486DX-50 \$1519

#003362

486DX2-66 \$1599

#003363

VESA Ready

Deluxe Systems

486SX-33 \$999

#006300

- Statistics:**
- VESA Local Bus Motherboard
 - 80486SX-33 Processor
 - 128K High-Speed Cache
 - 2 Mb High-Speed RAM
 - 80 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - 14" SVGA, 39 Color Monitor
 - 16-Bit SVGA Card with 512K
 - 1 Parallel, 2 Serial & 1 Game Port
 - 101-Key Enhanced Keyboard
 - 5-Bay Mini-Tower Case
 - FREE Microsoft DOS 6.0 Installed

486SX-33 \$1279

#006301

- Statistics:**
- VESA Local Bus Motherboard
 - 80486SX-33 Processor
 - 128K High-Speed Cache
 - 4 Mb High-Speed RAM
 - 130 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - 1.2 Mb 5.25" Floppy Drive
 - 14" SVGA, 28 Non-Interlaced Color Monitor
 - 16-Bit SVGA Card with 1 Mb
 - 1 Parallel, 2 Serial & 1 Game Port
 - 101-Key Enhanced Keyboard
 - High-Resolution, 3-Button Mouse
 - 5-Bay Mini-Tower Case
 - FREE Microsoft DOS 6.0 Installed
 - FREE Microsoft Windows Installed

VESA Ready

Multimedia Systems

486DX-33 \$1769

#006308

- Statistics:**
- VESA Local Bus Motherboard
 - 80486DX-33 Processor
 - 128K High-Speed Cache
 - 4 Mb High-Speed RAM
 - 170 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - Internal Multimedia CD-ROM Drive with Software Library
 - High-Performance Sound Card
 - Digital-Quality, Compact Speakers
 - 14" SVGA, 28 Non-Interlaced Color Monitor
 - 16-Bit SVGA Card with 1 Mb
 - 1 Parallel, 2 Serial & 1 Game Port
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486DX2-50 \$1879

#006309

486DX2-66 \$1999

#006310

VESA Value Systems

486DX-33 \$1469

#006302

- Statistics:**
- VESA Local Bus Motherboard
 - 32-Bit VESA Local Bus SVGA Video Card
 - 32-Bit VESA Local Bus IDE Card
 - 80486DX-33 Processor
 - 128K High-Speed Cache
 - 4 Mb High-Speed RAM
 - 170 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - 1.2 Mb 5.25" Floppy Drive
 - 14" SVGA, 28 Non-Interlaced Color Monitor
 - 1 Parallel, 2 Serial & 1 Game Port
 - 101-Key Enhanced Keyboard
 - High-Resolution, 3-Button Mouse
 - 5-Bay Mini-Tower Case
 - FREE Microsoft DOS 6.0 Installed
 - FREE Microsoft Windows Installed

486DX2-50 \$1579

#006303

486DX2-66 \$1699

#006304

VESA Windows Systems

486DX-33 \$1699

#006305

- Statistics:**
- VESA Local Bus Motherboard
 - 32-Bit VESA Local Bus IDE Card
 - 80486DX-33 Processor
 - 128K High-Speed Cache
 - 4 Mb High-Speed RAM
 - 210 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - 1.2 Mb 5.25" Floppy Drive
 - 15" SVGA, 28 Non-Interlaced Multi-Scan Color Monitor
 - Diamond Stealth 24 VESA Local Bus SVGA Video Card
 - 1 Parallel, 2 Serial & 1 Game Port
 - 101-Key Enhanced Keyboard
 - High-Resolution, 3-Button Mouse
 - 7-Bay Full-Tower Case
 - FREE Microsoft DOS 6.0 Installed
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486DX2-50 \$1809

#006306

486DX2-66 \$1929

#006307

VESA CAD Systems

486DX-33 \$2329

#006311

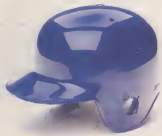
- Statistics:**
- VESA Local Bus Motherboard
 - 32-Bit VESA Local Bus IDE Card
 - 80486DX-33 Processor
 - 128K High-Speed Cache
 - 8 Mb High-Speed RAM
 - 340 Mb IDE Hard Drive
 - 1.44 Mb 3.5" Floppy Drive
 - 1.2 Mb 5.25" Floppy Drive
 - 17" SVGA, 28 Non-Interlaced Digital Color Monitor
 - Diamond Stealth 24 VESA Local Bus SVGA Video Card
 - 1 Parallel, 2 Serial & 1 Game Port
 - 101-Key Enhanced Keyboard
 - High-Resolution, 3-Button Mouse
 - 7-Bay Full-Tower Case
 - FREE Microsoft DOS 6.0 Installed
 - FREE Microsoft Windows Installed

486DX2-50 \$2439

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Elite 486SLC-33 Notebooks

MidWest Micro

Elite 486SLC-33 Subnote

When The Game Goes Into Extra Innings, You'll Be Glad You Have An Elite

Not only do the Elite 486SLC-33 Color and Monochrome Notebooks give you more computing power, they give you the power to compute longer. Use the SUSPEND/RESUME feature to avoid unnecessary system rebooting and compute up to 6 hours on a single charge*.

For those afternoon games, the Elite provides a large, non-glare VGA screen that eliminates distortion, flickering and eye strain so you can compute comfortably. Text and graphics appear at 640 x 480 resolution in 64 gray shades or 256 colors.

And if you get caught up in the action, a quick glance at the LCD panel lets you know which drives are being accessed, when battery power is low, what function keys are enabled, whether external power is being used and if there is a modem ring. With the Elite's LCD panel, you'll never feel like you're out in left field.



Elite 486SLC-33 Color

| Model | Item # | Price |
|--------|--------|--------|
| 80 Mb | 005461 | \$1699 |
| 120 Mb | 005466 | \$1769 |
| 200 Mb | 005471 | \$1889 |

Elite 486SLC-33 Monochrome

| Model | Item # | Price |
|--------|--------|--------|
| 80 Mb | 005446 | \$1209 |
| 120 Mb | 005451 | \$1279 |
| 200 Mb | 005456 | \$1399 |

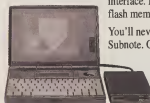
Statistics:

Processor:
Cyrix 486SLC
Processing Speed:
33 MHz
RAM:
2 Mb RAM, expands to 8 Mb
Hard Drive:
80 Mb, 120 Mb or 200 Mb
Floppy Drive:
Built-in 1.44 Mb 3.5"
Screen:
Color - 9", 256 colors
Monochrome - 10", 64 gray shades
Video RAM:
Color - 512K
Monochrome - 256K

Keyboard:
83 key with 101-key emulation
2-button thumbball mouse
Weight:
Color - 5.7 lbs. with battery
Monochrome - 5.4 lbs. with battery
Battery Life*:
Color - 4 hours
Monochrome - 6 hours
640 x 480 resolution
Simultaneous video
Advanced Power Management
One parallel and one serial interface
External VGA monitor and keyboard connectors
FREE AC adapter carrying case and MS-DOS 6.0 installed
One-year manufacturer's warranty

Take Me Out To The Ball Game

Compact and lightweight, the 486SLC-33 fits you like a glove. It weighs only 3.7 lbs. and measures 10" x 7" x 1.6", but is more advanced than notebooks twice its size. The Elite 486SLC-33 Subnote comes with a 33 MHz Cyrix processor and 2 Mb of RAM. Need grand slam power? Add an easy-to-install RAM upgrade or take advantage of the latest technology with the Subnote's Type II PCMCIA interface. It allows you to install PCMCIA cards for flash memory, modems and network adapters.



You'll never run out of storage space with the Elite Subnote. Once you fill its 80 Mb removable hard drive, simply take it out and insert another hard drive. There's no limit to the number of hard drives you can fill...or files you can save.

You'd think a small sub notebook would be hard to work on—but it's not. The Elite

Subnote rounds out its bases with a 7.4" high-contrast screen that displays 640 x 480 VGA resolution and 64 gray shades.

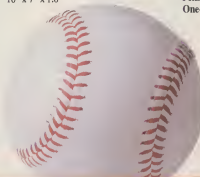
Elite 486SLC-33 Subnote

| Model | Item # | Price |
|-------|--------|--------|
| 80 Mb | 005415 | \$1359 |

Statistics:

Processor:
Cyrix 486SLC
Processing Speed:
33 MHz
RAM:
2 Mb RAM, expands to 8 Mb
Hard Drive:
Removable 80 Mb hard drive
Screen:
7.4" high-contrast screen
640 x 480 VGA resolution
64 gray shades
Video RAM:
256K
Weight:
3.7 lbs. with battery
Size:
10" x 7" x 1.6"

Battery:
Nickel metal hydride battery
Up to eight hours with APM*
Keyboard:
79-key with 101-key emulation
Built-in 2-button trackball
Drag button
Interfaces and Ports:
Parallel and serial interfaces
External keyboard, monitor and modem connectors
External floppy port
PCMCIA Type II slot
Advanced Power Management
Simultaneous video
FREE external 3.5" 1.44 Mb floppy drive,
AC adapter and utilities support disk
FREE MS-DOS 6.0 installed
One-year manufacturer's warranty



*Battery life measured with Power Management enabled. Actual battery life may vary.

Elite 486SX/DX Notebooks

MidWest Micro

Elite 486SX-25 Subnote

With 27 Notebooks to choose from, everyone is a player.

Everyone loves our new line of Elite 486 Notebooks. Choose your Elite with an Intel 486SX-25, 486DX-33 or 486DX2-50 processor, select an active color, dual-scan color or monochrome screen and then pick the hard drive that best meets your needs—from 80 Mb up to 200 Mb!

No matter which processor, screen or hard drive you choose, your Elite 486 Notebook comes standard with 4 Mb of RAM and can be upgraded to 20 Mb.

Isn't it a relief to know that whether you're a teacher, doctor, lawyer, sales representative, student or homemaker, there's an Elite 486 Notebook perfectly matched to your needs...and your budget?

Statistics:

Processor:
Intel 486SX-25, 486DX-33 or 486DX2-50

RAM:
4 Mb, expands to 20 Mb

Hard Drive:
80 Mb, 120 Mb or 200 Mb

Screen:
10", 640 x 480 VGA resolution

Backlit display
Color - 256 colors

Monochrome - 64 gray shades

Battery Life*:
Active Color - 3 hours

Dual-Scan Color - 4 hours

Monochrome - 6 hours

Weight:

Color - 6.9 lbs.

Monochrome - 6.4 lbs.

512K Video RAM

86 keys with 101-key emulation

Built-in trackball

Built-in 1.44 Mb, 3.5" floppy drive

Advanced Power Management

One parallel and one serial port

External VGA and keyboard connectors

One PCMCIA Type III slot/

two Type II slots

FREE AC adapter and utilities disk

FREE MS-DOS 6.0 installed



The Best In The Field...

If you're looking for a powerful portable, the Elite 486SX-25 Subnote is a great catch. Weighing a mere 3.9 lbs., the 486SX-25 Subnote features a large 10" VGA screen, 4 Mb of RAM that expands to 12 Mb and up to a 200 Mb hard drive.

But, that's not all! The Elite Subnote scores high with its special Intel processor for low power consumption, Advanced Power Management and PCMCIA Type II slot for modems, flash memory, network adapters and more.

All this for under \$1500? Only at MidWest Micro—so call us today and get your Elite Subnote for peanuts.

486SX-25 Subnote

| Model | Item # | Price |
|--------|--------|--------|
| 80 Mb | 005575 | \$1499 |
| 120 Mb | 005576 | \$1549 |
| 200 Mb | 005577 | \$1639 |



Statistics:

Processor:

Intel 486SX

Processing Speed:

25 MHz

RAM:

4 Mb expands to 12 Mb

Hard Drive:

80 Mb, 120 Mb or 200 Mb

Screen:

10", 640 x 480 VGA resolution

Backlit display

64 gray shades

Battery Life*:

5 hours

Weight:

3.9 lbs.

512K Video RAM

83 keys with 101-key emulation

Built-in trackball

External 1.44 Mb, 3.5" floppy drive

Advanced Power Management

One parallel and one serial port

External VGA and keyboard connectors

One PCMCIA Type II slot

FREE AC adapter

FREE MS-DOS 6.0 installed

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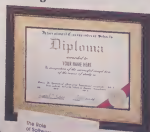
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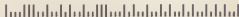
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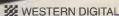
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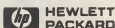
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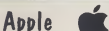
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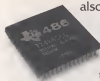
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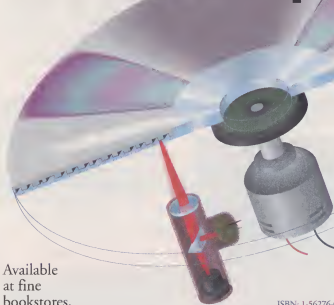


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| 106MB Seagate Hard Drive 32K Cache 32-Bit VESA Local Bus IDE Controller \$200 | 130MB Maxtor Hard Drive 64K Cache 32-Bit VESA Local Bus IDE Controller \$210 | 170MB Coroner Hard Drive 64K Cache 32-Bit VESA Local Bus IDE Controller \$240 | 212MB Maxtor or Western Digital 64K Cache 32-Bit VESA Local Bus IDE Controller \$270 | 250MB Maxtor or Coroner 64K Cache 32-Bit VESA Local Bus IDE Controller \$290 | 340MB Maxtor or Coroner 13ms 64K Cache 32-Bit VESA Local Bus IDE Controller \$360 |
| 3rd CHOOSE YOUR VESA LOCAL BUS VIDEO CARD | | | | | |
| Crinal Logic Chipset w/1MB VLB 16.7 Million Colors \$95 | STB Horizon VL 1MB 16.7 Million Colors \$100 | Diamond Speed Star Pro VLB w/1MB 16.7 Million Colors \$100 | Diamond Stealth 24 VLB w/1MB 16.7 Million Colors \$135 | STB Powergraph 1MB VLB 16.7 Million Colors \$135 | Diamond Stealth Pro 2MB VLB 16.7 Million Colors \$310 |
| 4th CHOOSE YOUR MONITOR | | | | | |
| TC 14" 28mm SVGA NI Monitor 1026x768 \$280 | Viewsonic 14" V8 28mm SVGA NI Monitor \$325 | Orchestra 15" 28 SVGA NI Monitor 1260x1024 \$410 | Mag LX 1564 16" Non Digital SVGA NI Monitor \$430 | Viewsonic VEP8 or Mag WX15F 15" SVGA NI Monitor \$530 | Viewsonic 15 1/2" 28mm SVGA NI 768x1024 \$550 |
| 5th CHOOSE YOUR CD ROM OR CD ROM & SOUND CARD BUNDLE | | | | | |
| Mitsumi 0033 CD Rom 375ms/150KB w/Adapter \$199 | Philips 205 CD Rom 350ms/150KB w/Adapter \$225 | Sony 31A CD Rom 150KB w/Adapter \$230 | Toshiba 3024 CD Rom 280ms/300KB w/SCSI Adapter \$370 | Mitsumi & Atech Labs NX Pro Sound Card 350ms/150KB \$320 | Philips 205 & Pro Audio Spectrum 16 Sound Card 350ms/150KB \$350 |



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486SX-25 \$1499 486SX-33 \$1599
486DX-33 \$1699

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- Full Tower Case w/8 Drive Bays
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- 17" Viewsonic Non-Interlaced 1280x1024 Monitor
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- 540MB IDE Hard Drive w/256K Cache 10ms
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- 1.2 & 1.44MB High Density Floppy Drives
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486DX-33 \$3695

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| | | |
|--|--|--|
| <p>\$45M Center 10ms 256K Cache 50-Bit VESA Local Bus IDE Controller</p> <p>\$690</p> | <p>CACHING HARD DRIVE CONTROLLER OPTION</p> <p>Promise Technology Caching VESA Local Bus Controller with 2MB RAM expandable to 10MB on board</p> <p>Add \$179</p> | |
| <p>Diamond Viper VLB 1MB 16.7 Million Colors 1280x1024</p> <p>\$290</p> | <p>Diamond Viper VLB 2MB 16.7 Million Colors 1280x1024</p> <p>\$370</p> | <p>ATI Ultra Pro 2MB 16.7 Million Colors 1280x1024</p> <p>\$450</p> |
| <p>Viewsonic VPro Mag MX 17" 17" SVGA NI Monitor</p> <p>\$930</p> | <p>Viewsonic 17" 76Hz 17" SVGA 1280x1024 Monitor</p> <p>\$1120</p> | <p>Viewsonic 20" 76Hz 20" SVGA 1280x1024 Monitor</p> <p>\$1830</p> |
| <p>Sony 31A & Sound Blaster 16 Sound Card</p> <p>\$420</p> | <p>Teac 3024 & Pro Audio Spectrum Sound Card 280ms/300KB</p> <p>\$490</p> | <p>Toshiba CD Rom & Turtle Beach Professional Sound Card 200ms/330KB</p> <p>\$950</p> |

Windows Workstation **POWER**

- Intel 486 Processor
- Vesa Local Bus Motherboard w/256K Cache
- Upgradeable to Pentium P24T
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- Mag MX15F Color Digital Monitor 76Hz Refresh
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486DX-33 \$2459

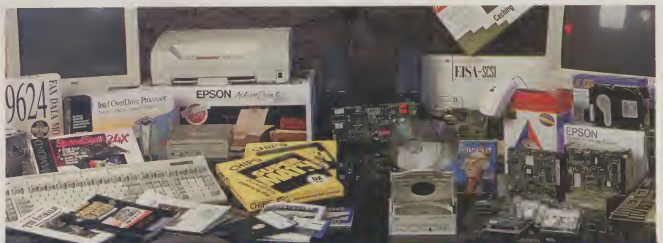
486DX2-66 \$2659

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- Microsoft DOS 6.0 and Windows 3.1
- Next Generation Genuine Microsoft Serial Mouse



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HARD DRIVES

| | | | |
|--------------------|-----------------|---------------------------------|--------|
| 105 MB | Seagate | 105MB 15ms IDE Cache (ST3120A) | \$169 |
| 120/130MB | Seagate | 130MB 15ms IDE Cache (ST3144A) | \$179 |
| | Maxtor | 130MB 15ms IDE Cache (MX7120A) | \$179 |
| | Conner | 120MB 17ms IDE Cache (CP30104H) | \$175 |
| 170MB | Conner | 170MB 13ms IDE Cache (CP30170) | \$189 |
| 200MB | Maxtor | 213MB 15ms IDE Cache (MX7213A) | \$229 |
| | Maxtor | 213MB 15ms SCSI Cache (MX7213S) | \$279 |
| | Western Digital | 212MB 15ms IDE Cache (WD2200A) | \$229 |
| | Seagate | 214MB 13ms IDE Cache (ST3243A) | \$229 |
| 250MB | | 245MB 12ms Cache IDE (M7245A) | \$245 |
| | Maxtor | 250MB 12ms IDE Cache (WD250A) | \$245 |
| | Conner | 254MB 12ms IDE Cache (CP3254A) | \$245 |
| 330MB | | 340MB 12ms IDE Cache (MX7345A) | \$309 |
| | Maxtor | 340MB 12ms SCSI Cache (MX7345S) | \$339 |
| | Western Digital | 340MB 12ms IDE Cache (WD2340A) | \$349 |
| | Fujitsu | 420MB 12ms IDE Cache (FJ2623A) | \$439 |
| | Fujitsu | 420MB 12ms SCSI Cache (FJ2623F) | \$439 |
| 500MB | | 510MB NEW Cache SCSI (MX7545SL) | \$509 |
| | Maxtor | 510MB 12ms IDE Cache (FJ2624T) | \$679 |
| | Fujitsu | 520MB 12ms Cache SCSI (FJ2624S) | \$699 |
| | Conner | 540MB 10ms IDE Cache (CP3544A) | \$699 |
| 1000MB | | 1000MB 12ms Cache SCSI (P0125) | \$999 |
| OVER 1500MB | Maxtor | 1500MB 13ms Cache SCSI (P1175) | \$1299 |

SCSI CARDS

| | | |
|---------------------|--|-------|
| CREATIVE | Sound Blaster Pro deluxe | \$110 |
| CREATIVE | Sound Blaster 16, 16-Bit Sound Card | \$155 |
| CREATIVE | Sound Blaster 16 ASP, 16-Bit Professional Card | \$229 |
| MEDIA VISION | Pro Audio Spectrum 16-Bit Sound Card | \$159 |
| ADAP | Compatible Game Sound Card (great for game software) | \$35 |
| WINBBS | Seestown Audio Card upgradeable 16-Bit w/20 Voices \$110 | \$110 |
| SCAND GALAXY | by Action Labs Vx Pro 16, 16-Bit Sound Card | \$159 |
| TURTLE BEACH | Professional Sound Card 16-Bit | \$269 |
| SPEAKERS | Technique shielded Speakers with volume control and built in amplifier | \$25 |
| | Personal Stereo Speaker 10 Watt Per Channel | \$40 |
| | Altec Lansing Multimedia Speaker System 30 Watts Per Channel (ACS200) | \$159 |
| | Altec Lansing Multimedia Speaker System with Sub Woofer (ACS300) | \$199 |

CD-ROM DRIVES

| | | |
|--|--|-------|
| TELEX | 265ms access time, 64K buffer, 300K/Bsec Data Transfer | \$339 |
| | Internal drive with 8-Bit controller | \$379 |
| | External bare drive no controller | \$439 |
| PHILLIPS & MITSUMI INTERNAL CD ROMs with Fast Data Access 375ms & 350ms, 32K Memory Buffer, 150K/B or better sustained throughput. Comes with MFC CD ROM Specs, Includes Interface & Cables, Photo CD Ready | | \$225 |
| Philips | | |
| Mitsumi | | |

CD-UPGRADE KITS

| | | |
|----------------------------------|---|-------|
| TELEX | Internal CD ROM 265ms 64K Cache 300K/B sec transfer Media Vision Pro Audio Spectrum 16-Bit Sound Card | \$465 |
| MITSUMI & AZTECH LABS | Internal CD ROM L1005 350ms 150K/Bsec 16-Bit Sound Card | \$399 |
| | 6 CD Titles including (Multimedia Encyclopedic, Animals, Reference Library, Us & World Atlas and Monkey Island) | |

CONTROLLER CARDS

| | | |
|--|-------|--|
| Caching Controllers (ISA) | | |
| Promise IDE HardFloppy w/20 exp. to 16MB (DC200) | \$95 | |
| Promise IDE HardFloppy w/20 exp. to 16MB w/Winning (DC203C) | \$159 | |
| Caching Controllers (VESA Local Bus) | | |
| Promise IDE VESA Local Bus HardFloppy w/20 exp. to 16MB (DC4030) | \$129 | |
| Caching Controllers (ISA) | | |
| DTTC SCSI HardFloppy w/512K expandable to 16MB (3290) | \$469 | |
| Non-Caching Controllers | | |
| 16-Bit DR HardFloppy Cont. w/1Par, 25er, 1 Game Pt. IDE (DFIDEI) | \$29 | |
| 16-Bit HardFloppy Cont. w/1Par, 25er, 1 Game Pt. IDE (IDG0) | \$19 | |
| DTTC SCSI HardFloppy Controller no I/O ports (3290) | \$115 | |
| VESA Local Bus IDE HardFloppy Controller w/1 par, 25er, 1 Game Pt. (VLIDE) | \$39 | |
| DTTC ISA IDE Controller Card 32-Bit HardFloppy (3290) | \$119 | |
| DTTC VESA SCSI Controller Card 32-Bit HardFloppy (3290) | \$379 | |
| DTTC VESA SCSI Controller Card 32-Bit HardFloppy (3270) | \$215 | |
| 16-Bit DR HardFloppy Cont. w/1Par, 25er, 1 Game Pt. (DFIDEI) | \$69 | |

MONITORS

| | | |
|--|---|--------|
| ViewSonic | | |
| VE | 14" 1024x768 Non Interlaced 28 | \$319 |
| VSE | 14" 1024x768 Non Interlaced 28 72Hz | \$379 |
| V5 | 14" 1024x768 Nt 25 72Hz Trinitron | \$459 |
| VEFS | 15" 704x768 Nt Interlaced 28 | \$469 |
| V7 | 17" 1024x768 Nt Interlaced 28 Digital | \$699 |
| V8 | 17" 1024x768 Nt Interlaced 28 Digital | \$1599 |
| The New ViewSonic | | |
| ViewSonic 15 1280x1024 | refresh rate @ 1024x768 | \$529 |
| ViewSonic 17 1280x1024 | refresh rate @ 1280x1024 | \$1099 |
| ViewSonic 17 1280x1024 | programmable modes | \$1799 |
| MAG INNOVISION | | |
| PMV1448 | 14" 1024x768 Non Interlaced 28 | CALL |
| LX1584 | 15" 1280x1024 Non Interlaced 28 | CALL |
| MX15F | 15" 1280x1024 Nt Digital | CALL |
| MX17F | 17" 1280x1024 Nt Digital | CALL |
| ORCHESTRA Monitors | | |
| 14" 35mm SVGA 1024x768 Interlaced 50-70Hz Vertical | \$205 | |
| 14" 28mm SVGA 1024x768 Interlaced 50-70Hz Vertical | \$239 | |
| 14" 28mm SVGA 1024x768 Non Interlaced 50-80Hz Vertical | \$269 | |
| 15" 28mm SVGA Flat 1280x1024 Nt 47-104Hz Vertical | \$269 | |
| 17" 28mm SVGA Flat 1280x1024 Nt 50-100Hz Vertical | | |
| | Microprocessor preset controls with LCD display | |

MOTHERBOARDS

| | | |
|--|---|-------|
| 486 VESA LOCAL BUS MOTHERBOARDS | | |
| 486SX-25 | Intel CPU 8 Slots w/2 Vesa Slots 128K Cache | \$159 |
| 486DX-33 | Intel CPU 8 Slots w/2 Vesa Slots 128K Cache | \$259 |
| 486DX-33 | Intel CPU 8 Slots w/2 Vesa Slots 128K Cache | \$425 |
| 486DX-50 | Intel CPU 8 Slots w/2 Vesa Slots 256K Cache | \$559 |
| 486DX-66 | Intel CPU 8 Slots w/2 Vesa Slots 256K Cache | \$689 |
| 386 ISA MOTHERBOARDS | | |
| 386SX-33MHz | AMD CPU 6 Slots | \$75 |
| 386DX-33MHz | AMD CPU 8 Slots 64K Cache | \$75 |
| 386DX-40MHz | AMD CPU 8 Slots 64K Cache | \$119 |
| 386DX-40MHz | AMD CPU 8 Slots 128K Cache Upgradeable to 486 | \$169 |
| 486 ISA MOTHERBOARDS | | |
| 486SX-25MHz | Intel CPU 8 Slots 128K Cache Upgradeable to any Intel 486 | \$159 |
| 486DX-33MHz | Intel CPU 8 Slots 128K Cache Upgradeable to any Intel 486 | \$259 |
| 486DX-33MHz | Intel CPU 8 Slots 128K Cache Upgradeable to any Intel 486 | \$415 |
| 486DX-50MHz | Intel CPU 8 Slots 256K Cache Upgradeable to any Intel 486 | \$559 |
| 486DX-50MHz | Intel CPU 8 Slots 256K Cache Upgradeable to 486DX-66 | \$59 |
| 486DX-66MHz | Intel CPU 8 Slots 256K Cache Will accept all Intel 486 CPUs | \$679 |
| 486 EISA MOTHERBOARDS | | |
| 486DX-33MHz | Intel CPU EISA & VESA SLOTS 256K Cache | \$729 |
| 486DX-50MHz | Intel CPU EISA & VESA SLOTS 256K Cache | \$779 |
| 486DX-66MHz | Intel CPU EISA & VESA SLOTS 256K Cache | \$859 |

VGA CARDS

| | | |
|-------------------------------------|---|-------|
| ISA Video | | |
| ATI Graph | w/1MB VRAM | \$159 |
| Diamond | 4000 ISA w/1MB Dram and S3 Chipset | \$135 |
| Diamond | Slasht Pro ISA w/1MB Ram and S3 Chipset | \$225 |
| Diamond | Slasht Pro ISA w/2MB Ram and S3 Chipset | \$265 |
| STB Powergraph | ISA w/1MB S3 Chipset 44 Winmarks | \$129 |
| 16-Bit 1MB Windows Accelerator 16.7 | | \$69 |
| 16-Bit 1MB Trident Chipset | | \$35 |
| 16 256K VGA Card | | \$50 |
| Local Bus Cards | | |
| Diamond | VLB MB /RUNS 52 Million Winmarks | \$129 |
| SpeedStar | Pro VLB w/1MB Ram and Cmos Chipset | \$99 |
| no Slasht | 24VLB w/1MB Dram and S3 Chipset | \$135 |
| no Slasht | Pro VLB w/1MB Ram and S3 Chipset | \$225 |
| no Slasht | Pro VLB w/2MB Ram and S3 Chipset | \$279 |
| omons Viper | 2MB Vram and Winlet Chipset | \$379 |
| Cosmos Logic | 1MB VLB Dram Expandable to 2MB | \$109 |
| Tring Labs | ET4000 VLB MB Dram | \$105 |

MODEMS

| | |
|-------------------------------------|-------|
| 2400 Baud Internal | \$29 |
| 9624 Fax Modem Internal | \$45 |
| Twonum 14400 External | \$189 |
| Twonum 14400 External | \$259 |
| Supra 14400 Internal | \$179 |
| Supra 14400 External | \$269 |
| ECO (T1 Band) 14400 Internal | \$289 |
| PT250 Powerpage 2 Digabyte Int. Cal | |
| PT500 Powerpage 4 Digabyte Int. Cal | |

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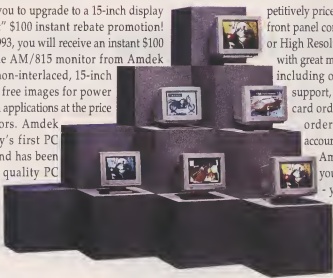
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petitively priced, non-interlaced 14", 15" or 17" displays with front panel controls in a range of resolutions (VGA, SVGA or High Resolution). Amdek "Direct" provides customers with great monitor prices, a 30-day money back guarantee including original freight, free technical and service support, a one year warranty, no surcharge on credit card orders, special low pricing on evaluation unit orders, and special programs for corporate accounts. Call us at 1-800-72-AMDEK and buy from Amdek "Direct" or, if you prefer, we will give you the name of the Amdek reseller nearest you - your choice! The best combination of great prices, proven support and immediate availability from a company with over fourteen years of experience!



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| Screen Size | 14"FS Mono | 14"Color | 14"Color | 14"Color | 14"Color | 15"FSColor | 17"FSColor |
| Max Refresh Rate | 60Hz | 60Hz | 60Hz | 60Hz | 72Hz | 72Hz | 72Hz |
| Dot Pitch | N/A | .31mm | .28mm | .28mm | .28mm | .28mm | .26mm |
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| *Unit 2-9 Price | \$106 | \$263 | \$292 | \$321 | \$350 | (\$389 After) | \$828 |
| *Eval. Unit Price | \$94 | \$229 | \$259 | \$289 | \$309 | (\$100 Rebate) | \$749 |

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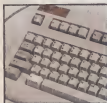
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Circle 193 on reader service card.

"FIRST-CLASS COMPONENTS"

Computer Shopper, February 1993



The ARES Flash 101: Every key is programmable, eight times over!



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"A FAST-MOVING COMPANY WITH GUTS AND GUMPTION"

PC Sources, September 1991



10
Reliable
YEARS



Windows Sources said our 486-66DX2 was the best. PC Sources said the same thing about our 486-33DX. The rave reviews keep pouring in.

We're no rookies. We're celebrating our 10th year of manufacturing computers! At the rate we're growing, we'll be around longer than you will.

ARES always looks toward the future. That's why we've included a "P24T" ZIF socket on all our EISA/VESA motherboards...

Configurations showing this icon can be at your door in 48 hours! And ARES now offers fast delivery for all systems!

Why do we do so much testing before a system leaves here? Simple: we care about quality, and this is how we prove it.

"ARES IS BETTER THAN EVER"

ARES President Steve Wagstaff, June 1993

Welcome to ARES. You've probably noticed some changes: a new look, a new logo (below), and some new products (like the ARES Ascension Series). There's one thing that hasn't changed, though, and that's our philosophy: to design, build and deliver the highest quality computer hardware on earth. And though our drive to deliver the best has become nothing short of an obsession, it's still secondary to the drive we have to satisfy you, our customer. Why change that?

Below are some comments about ARES. There's only so much we can tell you ourselves; the rest we'll leave to users and reviewers...



"Inside, ARES aims for perfection: Components are firmly secured, cables are neatly folded, and wires are braided to improve airflow."

PC Magazine, September 15, 1992

"I commend ARES for forging one of the most enlightened customer support plans in the industry. The 486-33...is an outstanding buy-and more so because of the company that stands behind it."

Russ Lockwood, PC Sources, May 1991

"The...ARES 486DX2 VL-Bus demonstrates that combining a solid-performing, useful system and application software, and close attention to details can yield a superior system."

Chris DeVosy, Windows Sources, March 1993

"...when I opened up the case of my ARES, I knew this was a breed apart. The care given to detail, with all cables braided and tied down where they couldn't snag, the dab of paint on the screw heads so they wouldn't loosen by accident, and the dab of sealant on all the connections to hold them secure, all told me that this machine was no assembly line clone. It is quite obvious the ARES builds computers like a precision machine, not just as a piece of merchandise."

Ron Lichty, ARES owner

"The ARES scored higher than any other machine we've tested to date."

Michael Penwarden, Windows Magazine, May 1993

"The ARES...offers one of the best combinations of price, power, and support on the market today."

Steven J. Vaughan-Nichols, Computer Shopper, Sept. 1991

"ARES, which has culled a reputation for using first-class components to build quality computers, doesn't disappoint expectations when it comes to its MPC configuration."

Arlan Levitin, Computer Shopper, Feb. 1993

"I researched seven different mail order companies, narrowed it down to Gateway and ARES, and ended up with ARES. I purchased an ARES because they are truly a people company..."

Carol Green, ARES owner

"UNCOMPROMISED PERFORMANCE"

PC Sources, May 1993



Incomparable insides: braided cables, sealed connections and a 250-watt power supply.

| Product | Word for Windows (two-f tests) | Excel test (graphics) | CorelDraw (graphics) |
|--------------------------------|--------------------------------|-----------------------|----------------------|
| Compaq deskpro 5/60M (Pentium) | 7th Fastest | 5th Fastest | 6th Fastest |
| Ares 486DX2/66 VL-Bus | 5th Fastest | 4th Fastest | 5th Fastest |
| Gateway DX2-66 | 10th Fastest | 10th Fastest | 10th Fastest |
| Compaq 486/50 | Quickest | Quickest | Quickest |

From PC Computing Lab report, July 1993.
Larger bars represent better performance relative to the Compaq 486/50.

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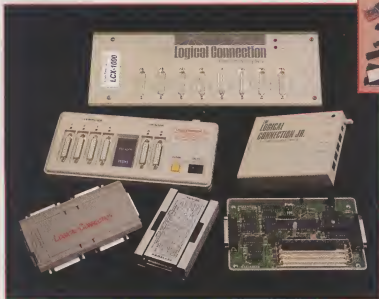
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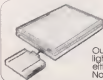
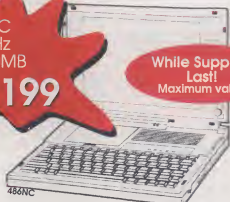
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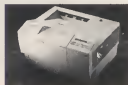
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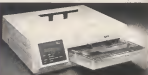
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Tom & Tom
of VTech have spent the last two years
making the most powerful line of computers
available today...and tomorrow.



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TWICE THE POWER. TWICE THE PERFORMANCE. TWICE THE EXPANDABILITY.

Introducing the VTech Platinum™ SMP Computers.
Affordable systems that can be upgraded from single processor to dual processor.



SMP brings program tasks into a dual processor environment. Each CPU shares the task working on separate parts of the program simultaneously which means double the processing capabilities. **More power to you!**

Symmetrical Multiprocessing or SMP allows two processors to work simultaneously. When two people share a job it's easier, faster, and a lot more gets done. The same is true with two processors working simultaneously. The VTech Platinum™ SMP computer, together with Windows NT, enables two processors to divide tasks between them. Like a two lane highway that suddenly becomes four lanes, processing flows with greater ease and efficiency. Two processors yielding twice the performance and power of traditional single processor PCs.

Everything You Want For Today. Everything You Need For Tomorrow.

No other competitor gives you the expandability options that VTech does. *When we say expandable, we mean expandable.* No more worrying about the specter of obsolescence. Each VTech Platinum™ SMP computer gives you the highest level of performance in Intel 486 based technology today while being user upgradable in the future with the Pentium™ OverDrive™ processor.

But more importantly, you can upgrade today, right now, immediately, when you need the muscle of multiprocessing. By adding a second processor board, along with the enabling software, your single processor system is transformed into a symmetrical multiprocessing system yielding twice the performance and power.

Circle 181 on reader service card.

The Next Wave in Personal Computing, Symmetrical Multiprocessing.

Introducing the VTech Platinum™ SMP computers, a revolutionary new line of desktop PCs with the future built-in, Symmetrical Multiprocessing or simply SMP. Developed at VTech by the industry's top advanced products engineering team, headed by Tom Craft and Tom Ludwig, the new VTech Platinum™ SMP computers set the performance pace. By combining current PC technology with workstation-like processing capabilities, these computers provide a level of power and performance that double existing desktop computing standards. Advanced technology affordably priced at today's standard 486PC level, the VTech Platinum™ SMP computers are uniquely positioned to meet emerging desktop and server applications while *protecting your investment against obsolescence.* No other 486 based computer can offer you this!



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


































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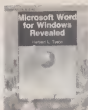
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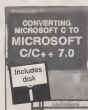
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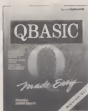
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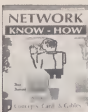
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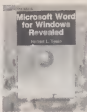




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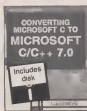
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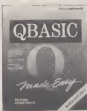
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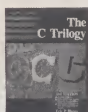
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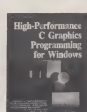
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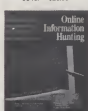
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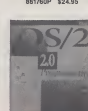
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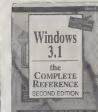
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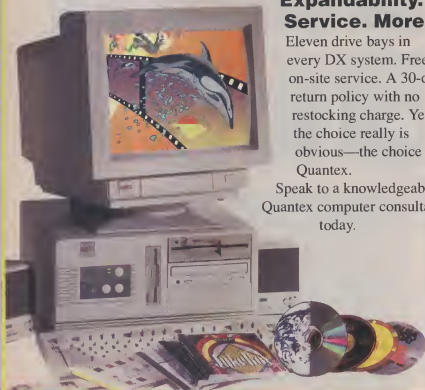
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- 32-Bit VL-Bus **ThunderPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors)
- 15" Flat Screen .28mm 1280x1024 Color Monitor (Low Radiation, 36% larger edge to edge display)
 - 2 Serial, 1 Parallel & 1 Game Ports
 - Enhanced 101-key Keyboard
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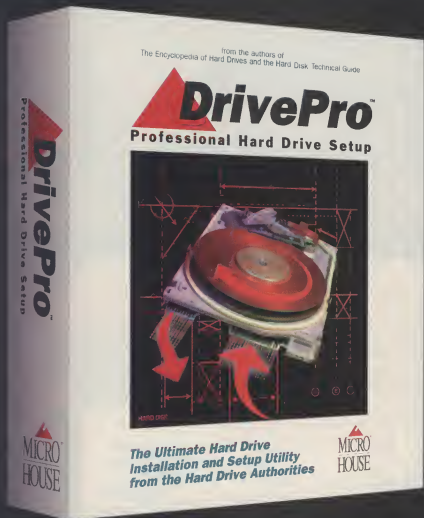
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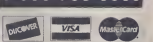
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| 11500120 | 1758.80 |
| 1150024 | 2338.44 |
| 11500250 | 1898.88 |
| 11500260 | 2486.27 |
| 11500270 | 2136.82 |
| 11500280 | 1988.88 |
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| 11502000 | 1768.82 |
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| 11502020 | 1586.80 |
| 11502030 | 1758.80 |
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| 11502050 | 1898.88 |
| 11502060 | 2486.27 |
| 11502070 | 2136.82 |
| 11502080 | 1988.88 |
| 11502090 | 1768.82 |
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| 11502110 | 1586.80 |
| 11502120 | 1758.80 |
| 11502130 | 2338.44 |
| 11502140 | 1898.88 |
| 11502150 | 2486.27 |
| 11502160 | 2136.82 |
| 11502170 | 1988.88 |
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| 11502800 | 1988.88 |
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| 11502960 | 2486.27 |
| 11502970 | 2136.82 |
| 11502980 | 1988.88 |
| 11502990 | 1768.82 |
| 11503000 | 2588.44 |

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| Pentec | | |
|--------|--------|------|
| 1624 | 328.95 | 2180 |
| 1625 | 323.95 | 2180 |
| 1626 | 323.95 | 2180 |
| 1627 | 323.95 | 2180 |
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| TEKAR INSTRUMENTS | | |
|-----------------------------------|--------|---------|
| microWater Base 50PM | | 612.95 |
| microWater P235 PG85 | 889.10 | 1009.50 |
| microLaser TurboPlus 35 80PM RISC | | 1375.55 |
| microMars III Jet | | 385.95 |

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|--------------------|--------|--------------|
| 1624 | 599.39 | Jet 450 |
| 1625 | 599.39 | LaserJet 450 |
| 1626 | 599.39 | LaserJet 450 |
| 1627 | 599.39 | LaserJet 450 |
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| 1674 | 599.39 | LaserJet 450 |
| 1675 | 599.39 | LaserJet 450 |
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| 1686 | 599.39 | LaserJet 450 |
| 1687 | 599.39 | LaserJet 450 |
| 1688 | 599.39 | LaserJet 450 |
| 1689 | 599.39 | LaserJet 450 |
| 1690 | 599.39 | LaserJet 450 |
| 1691 | 599.39 | LaserJet 450 |
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| 1695 | 599.39 | LaserJet 450 |
| 1696 | 599.39 | LaserJet 450 |
| 1697 | 599.39 | LaserJet 450 |
| 1698 | 599.39 | LaserJet 450 |
| 1699 | 599.39 | LaserJet 450 |
| 1700 | 599.39 | LaserJet 450 |
| 1701 | 599.39 | LaserJet 450 |
| 1702 | 599.39 | LaserJet 450 |
| 1703 | 599.39 | LaserJet 450 |
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| 1723 | 599.39 | LaserJet 450 |
| 1724 | 599.39 | LaserJet 450 |
| 1725 | 599.39 | LaserJet 450 |
| 1726 | 599.39 | LaserJet 450 |
| 1727 | 599.39 | LaserJet 450 |
| 17 | | |

| JETMETRIE 1MB for HP/INTEL | | |
|----------------------------|-------|--------|
| 1624 | 75.85 | 184.15 |
| 1625 | 75.85 | 184.15 |
| 1626 | 75.85 | 184.15 |
| 1627 | 75.85 | 184.15 |
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| 1688 | 75.85 | 184.15 |
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| 1696 | 75.85 | 184.15 |
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| 1711 | 75.85 | 184.15 |
| 1712 | 75.85 | 184.15 |
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| 1650 | 228.00 | 228.00 |
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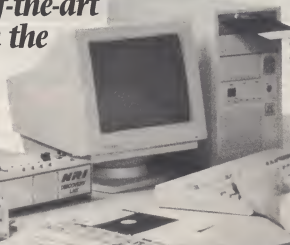
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| Maxtor | +33% | +30% | +33% | +33% |
| Micropolis | +80% | +29% | +34% | +34% |
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| 212Meg | 12ms | 4500 | 256K | 3 1/2" | CP30200 | \$299 | \$439 |
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| 120Meg | 18ms | 3399 | 32K | 3 1/2" | CP30104H | \$184 | \$199 |
| 174Meg | 17ms | 3822 | 32K | 3 1/2" | CP30174E | \$199 | \$214 |
| 212Meg | 12ms | 4500 | 256K | 3 1/2" | CP30204 | \$239 | \$254 |
| 251Meg | 14ms | 4542 | 32K | 3 1/2" | CP30254H | \$265 | \$280 |

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|----------|-------|------|-------|--------|----------|--------|--------|
| 520 Meg | 12ms | 4400 | 240K | 3 1/2" | M2624F | \$699 | \$839 |
| 1080 Meg | 9.5ms | 5400 | 256K | 3 1/2" | M2694ESA | \$999 | \$1139 |
| 2060 Meg | 12ms | 5400 | 256K | 5 1/4" | M2654ESA | \$1889 | \$2029 |
| IDE | | | | | | | |
| 520 Meg | 12ms | 4400 | 64K | 3 1/2" | M2624T | \$699 | \$714 |

MICROPOLIS

| SCSI | Speed | RPM | Cache | Form | Model | Bare | AT Kit |
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| 667 Meg | 16ms | 3600 | 256K | FH | MC1588 | \$799 | \$939 |
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| 1748 Meg | 14ms | 3600 | 256K | FH | MC1548 | \$1675 | \$1815 |
| 1750 Meg | 10ms | 5400 | 256K | 3 1/2" | MC2217 | \$1759 | \$1899 |
| 2100 Meg | 11ms | 5400 | 256K | FH | MC1924 | \$2179 | \$2319 |
| 3020 Meg | 11ms | 5400 | 256K | FH | MC1936 | \$2719 | \$2859 |
| IDE | | | | | | | |
| 560 Meg | 10ms | 5400 | 256K | 3 1/2" | MC2105A | \$869 | \$884 |
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| SCSI | Speed | RPM | Buffer | Form | Model | Bare | AT Kit |
|----------|-------|------|--------|--------|----------|--------|--------|
| 170Meg* | 17ms | 3663 | 32K | 3 1/2" | ELS170A | \$197 | \$337 |
| 240Meg* | 16ms | 4362 | 256K | 3 1/2" | LPS240A | \$269 | \$399 |
| 525Meg* | 10ms | 4500 | 512K | 3 1/2" | LPS525A | \$629 | \$769 |
| 1050Meg* | 10ms | 4500 | 512K | 3 1/2" | PRO1050S | \$929 | \$1069 |
| 1225Meg* | 10ms | 4500 | 512K | 3 1/2" | PRO1225S | \$1049 | \$1189 |
| IDE | | | | | | | |
| 170Meg* | 17ms | 3663 | 32K | 3 1/2" | ELS170A | \$194 | \$209 |
| 245Meg* | 16ms | 4306 | 256K | 3 1/2" | LPS240A | \$266 | \$281 |
| 525Meg* | 10ms | 4500 | 512K | 3 1/2" | LPS525A | \$626 | \$641 |

Seagate

| IDE | Speed | RPM | Buffer | Form | Model | Bare | AT Kit |
|--------|-------|------|--------|--------|----------|-------|--------|
| 43Meg | 28ms | 3600 | 8K | 3 1/2" | ST351A/X | \$125 | \$140 |
| 106Meg | 15ms | 3600 | 32K | 3 1/2" | ST3120A | \$162 | \$177 |
| 130Meg | 16ms | 3600 | 32K | 3 1/2" | ST3144A | \$178 | \$193 |
| 341Meg | 12ms | 4500 | 128K | 3 1/2" | ST3390A | \$348 | \$363 |
| 452Meg | 12ms | 4500 | 128K | 3 1/2" | ST3550A | \$487 | \$502 |

TOSHIBA

| SCSI-2 | Speed | RPM | Buffer | Form | Model | Bare | AT Kit |
|---------|-------|------|--------|--------|---------|-------|--------|
| 1230Meg | 12ms | 3600 | 512K | 3 1/2" | MK538FB | \$969 | \$1019 |



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| IDE | Speed | RPM | Buffer | Form | Model | Bare | AT Kit |
|--------|-------|------|--------|--------|----------|-------|--------|
| 212Meg | 13ms | 3600 | 64K | 3 1/2" | WDAC2200 | \$213 | \$228 |
| 256Meg | 12ms | 3322 | 64K | 3 1/2" | WDAC2250 | \$249 | \$264 |
| 341Meg | 12ms | 3322 | 64K | 3 1/2" | WDAC2340 | \$319 | \$334 |
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| IDE | Speed | Cache | RPM | Model | Form | Warranty | Bare | XT | AT |
|--------|-------|-------|------|---------|---------|----------|----------------------|-------|-------|
| 130 MB | 15ms | 64K | 3600 | M7131A | 3.5"x1" | 1yr | \$188 | \$228 | \$203 |
| 170 MB | 15ms | 64K | 3600 | M7170A | 3.5"x1" | 1yr | \$192 | \$232 | \$207 |
| 213 MB | 15ms | 64K | 3600 | M7213A | 3.5"x1" | 1yr | \$224 | \$264 | \$239 |
| 213 MB | 15ms | 64K | 3600 | M7213A2 | 3.5"x1" | 2yr | \$239 | \$279 | \$254 |
| 245 MB | 15ms | 64K | 3600 | M7245A | 3.5"x1" | 1yr | \$232 | \$272 | \$247 |
| 245 MB | 15ms | 64K | 3600 | M7245A2 | 3.5"x1" | 2yr | \$247 | \$287 | \$262 |
| 345 MB | 14ms | 64K | 3600 | M7345A | 3.5"x1" | 2yr | \$308 | \$348 | \$323 |
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| 540 MB | 8.5ms | 256K | 6300 | MXT540A | 3.5"x1" | 2yr | \$875 | \$915 | \$890 |

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|---------|-------|------|------|----------|---------|-----|--------|--------|---------|
| 120 MB | 15ms | 64K | 3600 | M7120S | 3.5"x1" | 2yr | \$195 | \$245 | \$335 |
| 213 MB | 15ms | 64K | 3600 | M7213S | 3.5"x1" | 2yr | \$258 | \$308 | \$398 |
| 245 MB | 15ms | 64K | 3600 | M7245S | 3.5"x1" | 2yr | \$269 | \$319 | \$409 |
| 340 MB | 15ms | 64K | 3600 | M7345S | 3.5"x1" | 2yr | \$398 | \$448 | \$538 |
| 546 MB | 8.5ms | 256K | 6300 | MXT540SL | 3.5"x1" | 2yr | \$809 | \$859 | »\$949 |
| 1240 MB | 8.5ms | 256K | 6300 | MXT1240S | 3.5" | 3yr | \$1229 | \$1279 | »\$1369 |

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Some customers may apply to the price guarantee. M7131A2 & M70542 only have a 1yr no quibble guarantee. Prices & specifications subject to change without notice. Shipping charges are non-refundable. Returns must be in original condition and in original packaging. Defective items may not be returnable. All returns are subject to a restocking fee. No returns on software or special orders (items not listed in ad). We reserve the right to refuse any sale. Potential credits held for clearance. All trademarks are registered trademarks of their respective companies.

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Circle 107 on reader service card.

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CD ROM DRIVES

Two Special Offers for DC CD Customers!

Each CD ROM drive purchased from DC Drives includes a free \$25 coupon for Photo CD processing.
With the purchase of any of our CD ROM Drives you may also purchase Kodak Photo CD Access Software & Photo Scanner (windows version) with a coupon worth up to \$62 for Photo CD processing for only \$25.
(Processing prices are good for services from AOL.)

MicroSolutions

Backup External CD ROM Drive, Plugs into Printer Port. 350ms, 128K buffer \$355



HILite CD ROM Drive kits feature the same Sony, Teac and Texel drives available from any other vendor.

These kits have 2 big advantages

Incredibly Low Price & a 2 year warranty!
HILite CD Bundle includes World & US Atlas, Toolworks Encyclopedia, The Animals, Chessmaster 3000, & Typing Tutor

SONY 2 Year Warranty!

- Model CDU-31A, 490ms, 64K Buffer.
- Multi-Session Photo CD, MPC, & XA Compatible. Internal Kit with controller \$229
- Internal Kit with controller & Mayo Clinic CD \$239
- MultiMedia Kit with Media Vision Spectrum 16, Speakers, and HILite CD Bundle. \$395

TECEL 2 Year Warranty!

- Model SCS-2 Interface, 265ms, 64K Buffer.
- 300KB Data Transfer Rate, 1.5 MB/sec Burst Rate.
- Multi-Session Photo CD, MPC, & XA Compatible. Internal Kit with Trantor T130 controller \$419
- MultiMedia Kit with Media Vision Spectrum 16, Speakers, and HILite CD Bundle. Super Price! \$539

TEAC 2 Year Warranty!

- Model SCS-2 Interface, 265ms, 64K Buffer.
- 335KB Data Transfer Rate, 1.5 MB/sec Burst Rate.
- Multi-Session Photo CD, MPC, & XA Compatible. Internal Kit with Adaptec 1522 16Bit controller \$479
- Internal Kit with Adaptec 1542 16Bit controller \$569

CD ROM SOFTWARE

Get CD ROM Software at Special Discount Prices with the Purchase of Any of Our CD ROM Drives!

- Bundle 1** San Diego Zoo The Animals, Grolier's Multimedia Encyclopedia (New Toolworks), \$95
- Toolworks World & US Atlas Pak, Toolworks Reference Library, Tempa Photo CD Access Compton's Family Encyclopedia, Microsoft Bookshelf, Languages of the World, National Geographic Mammals, Mixed-up Mother Goose, World Atlas \$79
- Power Tools** A library of over 3,000 Shareware programs. This is the best shareware disk we have seen. Includes Wolfenstein 3-D Game, Great Buy!

- | | | | |
|----------------------------|------|------------------------|------|
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| Business Atlas | \$20 | Carmen San Diego | \$34 |
| Chessmaster 3000 | \$35 | CIA World Fact Book | \$23 |
| Dictionary of Living World | \$45 | Dinosaur Adventure | \$41 |
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| Grolier Encyclopedia | \$39 | Guinness Record Book | \$35 |
| Languages of the World | \$32 | Library of the Future | \$59 |
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| Phoenix-CD | \$19 | Publish it | \$25 |
| Q and A | \$46 | Reference Library | \$29 |
| San Diego Zoo Animals | \$35 | US Atlas w/ Autopac | \$29 |
| US History | \$32 | Atlas Pak (World & US) | \$23 |

CD Software not sold separately only with CD ROM Drives.

PIONEER 6 Disk CD ROM Changer

- DRM-600A 600ms, 153KB/sec Data Transfer
 - DRM-600X 600ms, 612KB/sec Data Transfer (Fastest Data Transfer Rate Available with Pioneer Quadrapack)
 - MultiMedia, CD XA, & Kodak Photo CD Compatible.
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| 600A | 604X |
| \$829 | \$1229 |
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| 16Bit External Kit | \$979 |
| PS2 External Kit | \$999 |
| Macintosh External Kit | \$969 |
| Extra 6 Disk Magazines | \$22 |

TEAC

- CD-50, SCSI-2 Interface, 265ms, 64K Buffer.
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- 16Bit Internal Kit / External Kit \$465 / \$555

| Multi Media Kit | Includes |
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| SALE! | Media Vision Pro Audio 16 |
| Internal \$519 | CD-50 Drive |
| External \$599 | Media Vision Driver Software |
| Add \$30 for Studio 16 | Data and Audio Cables |

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Unparalleled speed and reliability set the 3401 CD ROM apart from the competition. Featuring fully integrated audio, the double speed drives, which are MPC compliant and support Multi-Session Kodak Photo CD, meet today's demanding requirements for CD ROM applications.

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- 16Bit Internal Kit / External Kit \$579 / \$699
- Printer Port Ext. Kit (T338) / (T348) \$689 / \$725
- Macintosh External Kit \$609
- External Drive / CD ROM Drive Stacks \$219 / \$299 / \$369
- 2 Drive / 4 Drive / 7 Drive \$1029 / \$2199 / \$3929

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HP Optical drives are available in a wide variety of jukebox forms.
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- 27ms, 3600RPM, 5 1/4" Full High.

This is a Multisession drive. Use rewritable or WORM (Write Once Read Many) media.
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1.3Gig is the new industry standard capacity. This drive will also read 850Mek cartridges. The performance of this drive is incredible. Rotation speed 3600RPM, 23.5ms, 512K buffer gives a 14ms effective access. Other features include Multifunction operation, SCSI-2 interface, and HP proven reliability. The new 1.3Gig media is only \$159 which is only 12 cents per meg.
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Maxoptix

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| 1 Gig WORM for Tahiti IIM Glass | 512K Sector | \$199 |
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- HP PACKARD
- 5 1/4" 650Mek 512K Sector WORM (HP82289A) \$139
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| 1542C | AT, SCSI, Floppy, Bus Mastering | \$209 |
| 1542CKIT | Novell, OS/2, UNIX, ZENIX, CD drivers | \$259 |
| 1542CKIT+ | Corel CD, Tape & Optical driver | \$325 |
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SCSI VALUE PAK KITS (SVP) include support for Hard Drive, CD ROM, includes SCSI Device Analyzer, Supports FastDisk 32Bit Disk Access in Windows 3.1. This feature makes your Windows 3.1 Screen.

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| 34F, VESA LOCAL BUS, SCSI | \$279 |
| 124F, EISA, 3 Channel SCSI Disk Array Cntrl | \$1599 |

MISC. CONTROLLERS

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| Local Bus ET4000 1MB VGA, 2 IDE, 2 Floppy, 2 Serial, 1 Parallel, 1 Game | \$169 |
| Local Bus 2 IDE, 2 Floppy, 2 Serial, 1 Parallel, 1 Game | \$69 |
| Local Bus 4 IDE, 2 Floppy, up to 16MB Cache | \$199 |
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| Always IN2000, AT, SCSI, 2 Floppy | \$174 |
| ADP-50 8 bit XT to run AT/IDE drives | \$29 |
| Micro Channel IDE | \$49 |
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| Compatible with XT, AT, 386, 486, Tandy, PS/2 30, 30-266 | |
| 8 Bit 16 Bit SCSI | |
| 45 Meg, 19ms | \$199 \$209 n/a |
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Larger Sizes Available. PS/2 requires SCSI model

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- 1533 Kits include drive, controller, cables, backup software, manual, mounting hardware, and 1 tape.
 - 1533 We have kits for all operating systems, DOS price listed.
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|------------------|----------|---------|----------|-----------|
| 250Meg | 6MB/min | \$349 | \$439 | \$549 |
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| 525Meg | 14MB/min | \$899 | \$959 | \$999 |
| 4-8Gig TURBO DAT | | \$1159 | \$249 | \$1339 |
- TURBO DAT is 88MB/min! Add \$100 for external.



HEWLETT PACKARD SALE!

- 1533 DAT Tape Backup
 - 1533 SCSI-2 Interface
 - 1533 Hewlett Packard, Quality you can trust!
- Kits include Drive, controller, Backup Software, Manual, Cables, and one 90 Meter tape.

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|---------|-----------|----------|--------|--------|--------|--------|
| 4-8Gig | 42MB/min | 35480A | \$1069 | \$1149 | \$1269 | |
| 4-16Gig | 130MB/min | 51533A | \$1699 | \$1999 | \$2499 | |

New! 6 cartridge DAT Changer Store up to 48Gig, \$2949

Add \$100 for external. Complete kits available for most computers.

EXABYTE

| 8mm SCSI tape drives | Barcode | 16 Bit |
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| 5Gig 15MB/min 8205 | Half Height | \$1389 \$1589 |
| 5Gig 29MB/min 8500 | Full Height | \$2249 \$2449 |
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- 1533 Floppy 1.2Meg or 1.4Meg / 2.8Meg
- 1533 Tape Backup 250Meg

TEAC

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| 5 1/4" 360K / 1.2Meg | \$57 / \$59 |
| 3 1/2" 1.4Meg / 2.8Meg | \$54 / \$95 |
| All Media Format 3 1/2" and 5 1/4" in one | \$109 |

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| High Quality Tape Cartridges | |
|------------------------------|---------------|
| DC2120 157.5' / 15.7 | |
| 90Meter DAT 4mm | \$17 / \$15.7 |
| 8mm 12Meter | \$15 / \$11 |

Miscellaneous Media

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| AT 1/5 | DAT Cleaning Tapes | \$19 / \$18 |
| MAG135 | 2.8Meg Diskettes | \$5 / \$4 |

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Pull out Hard Drive Bracket for 3.5" IDE / SCSI \$65 / \$129



We do SyQuest better than anyone!

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- 8BC drive will read and write to 44 or 88meg cartridge.

| | 44Meg | 88Meg | 8BC | 105 |
|-------------------------------|-------------|-------------|-------------|-------|
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| External AT (16bit) | \$539 | \$635 | \$649 | \$799 |
| External Kit for PS/2 | \$569 | \$669 | \$679 | \$799 |
| External Kit for Printer Port | \$529 | \$619 | \$609 | \$779 |
| External for Macintosh | \$399 | \$499 | \$519 | \$669 |
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105Meg IDE SCSI05 will mount in a 3 1/2" x 1" high bay. Very fast 14.5ms, with 64K buffer. Cartridge is a little larger than a 3.5" floppy.

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| Cartridge Qty. 1 / Qty. 5 | \$69 / \$65 |



- 21Meg Floptical Drive. Also reads 1.4meg & 720K disks.
- Barcode Internal / External
- 8Bit Kit w/ 2 disks Int. / Ext.
- 21meg disks Qty. 2 / Qty. 10

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- Very high quality design
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All NICE motherboards feature:

- ◆ Support for entire 486 CPU range and Intel OverDrive CPUs
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- ◆ Easily upgradeable—simply change CPU and oscillator kit
- ◆ 20 NS fast burst mode cache memory
- ◆ Metal latches on all SIMM sockets
- ◆ AMI BIOS, Selectable bus clock speeds
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- ◆ 50°C 48-hour Factory Burn-In Testing and retested by Aberdeen before shipment
- ◆ All purchased memory installed and tested with motherboard
- ◆ Made in USA

NICE
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| | ISA VLB | Mini EISA | Super EISA |
|-------------------------------|---------|-----------|------------|
| ZIF socket | 64 | 256 | 256 |
| Cache standard (KBytes) | 256 | 1024 | 1024 |
| Cache maximum (KBytes) | 32 | 128 | 256 |
| RAM maximum (MBytes) | 1 | 0 | 0 |
| ISA 8-bit slots | 7 | 5 | 0 |
| ISA 16-bit slots | 1 | 0 | 0 |
| VESA VLB 32-bit slots | 2 | 2 | 1 |
| EISA 32-bit slots (mastering) | 0 | 3(3) | 8(6) |
| Real-Time-Clock | ■ | ■ | Dallas |
| 2.88 MB Floppy Support | ■ | ■ | ■ |
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| 486SX25 | \$349 | \$435 | \$609 |
| 486SX33 | 399 | 485 | 659 |
| 486DX33 | 509 | 589 | 759 |
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| 486DX50 | 669 | 759 | 929 |
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| 256K cache upgrade | 50 | | |
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CPU Cooling HeatSink fan
with every 486SX2-66
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| 386SX33MHz AMI 16MB | \$109 |
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| 386SX40MHz and 128KB AMI | \$179 |
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See NICE 486 boards above

Hard Disk Drives

All drives IDE unless noted otherwise

| | |
|--------------------------------------|---------|
| Conner CP30084 84MB 15ms | \$167 |
| Conner CP30176 170MB 17ms | \$200 |
| Conner CP30540 4.545MB 12ms IDE/SCSI | \$740 |
| Conner CP31370 1.37GB 10ms SCSI | \$1,093 |
| Fujitsu HD547/FX 313MB 12ms IDE/SCSI | \$747 |
| Maxtor 7131A 131MB 15ms | \$196 |
| Maxtor 7245A 245MB 15ms | \$249 |
| Maxtor 7345 345MB 13ms | \$371 |
| Quantum ES127 127MB 17ms | \$199 |
| Quantum 240AT 240MB 15ms | \$211 |
| Seagate ST351A 45MB 28ms | \$111 |

| | |
|------------------------------------|---------|
| Seagate ST3144A 130MB 15ms | \$188 |
| Seagate ST3290A 260MB 16ms | \$253 |
| Seagate ST3390A 341MB 12ms | \$335 |
| Seagate ST3550A 452MB 12ms | \$524 |
| Seagate ST42100N 1.9GB 12 9ms SCSI | \$1,671 |
| Toshiba 358BF 1.2GB SC342 10ms | \$1,009 |
| WD AC1170 170MB 13ms | \$188 |
| WD AC2250 250MB 13ms | \$254 |
| WD AC2340 341MB 13ms | \$315 |

Display Adapters

| | |
|---------------------------------------|-------------|
| VGA 16bit 800x600 256K | \$39 |
| VGA 16bit 1024x768 512K | \$49 |
| VGA 1280x1024 WD 90C31 1MB 32K | \$99 |
| VGA 1024x768 Trident B900C2 1MB | \$79 |
| VGA 1280x1024 Tseng Labs 1MB 16MC | \$99 |
| ATI Graphics Ultra Pro 2MB ISA/VLB | \$379 |
| Diamond Stealth 24 2MB VLB | \$169 |
| Diamond Viper 16MB VRAM | \$419 |
| Genoa Windows 8500 VGA Cirrus VLB 1MB | \$119 |
| Volante Warp 108 VLB/2MB | \$C41/\$239 |

Monitors

| | |
|--------------------------------|-------|
| Tatung M1454E 14" Mono SVGA IR | \$129 |
| Tatung CM1458S 14" SVGA 28mm | \$285 |

| | |
|-----------------------------------|---------|
| Tatung CM144UE 14" Nt 28mm IR | \$335 |
| Sunshine CM7A 14" SVGA 39mm | \$221 |
| ADI 3C 14 1024 N 7216 28mm color | \$579 |
| ADI 4G 15 1280 N 7216 28 85 color | \$489 |
| ADI 5A 17 1280 N 20mm color | \$899 |
| ViewSonic 15 15 1280 28mm | \$559 |
| ViewSonic 17 16 1600 28mm | \$1,212 |
| ViewSonic 20 1600 28mm | \$1,971 |

Floppy Disk Drives

| | |
|----------------------------|-------|
| Teac 3.5 1.2MB internal | \$52 |
| Teac 3.5 1.44MB internal | \$58 |
| Teac 1.2MB and 1.44MB dual | \$139 |

I/O Boards, Misc. Adapters

| | |
|---|-------|
| AT 160 251PFC | \$19 |
| AT 160 251PFC 2416550 High speed | \$59 |
| 16bit IDE 2HD, 2FD, 251PFC | \$28 |
| 16bit ESDI 1 1 64K cache 2HD 2FD | \$149 |
| 16bit ISA IDE and 2FD caching <0.4ms | \$139 |
| 32bit VLB IDE and 2FD caching <0.3ms | \$109 |
| 32bit EISA IDE and 2FD caching <0.4ms | \$209 |
| 32bit EISA B742A SCSI bus-master contr. | \$319 |

| | |
|--|-------|
| 16bit ISA NE2000 comp. Ethernet | \$89 |
| 2400 baud internal modem | \$40 |
| 9600SD serial fax/modem MNP5 | \$59 |
| 9600SD serial fax/modem w/BF-as for Windows4.5 | \$489 |
| 14.4K internal fax/modem | \$179 |

Cases with Power Supply

| | |
|---|-------|
| All cases come with a UL power supply and are FCC Class B suitable. TUV/CSA available | |
| Baby AT 3x5.25, 2x3.5 230W PS | \$89 |
| Mini Tower, 2x5.25, 3x3.5 230W dual fans | \$79 |
| Full Tower 4x5.25, 3x3.5, 250W dual fans | \$127 |
| Super Tower 7x5.25, 300W PS, dual fans | \$139 |
| air filter, adjustable feet | \$278 |

Miscellaneous

| | |
|-----------------------------------|-------------|
| MaxSwitch 101 Talkback | \$38 |
| Keytone 101 Talkback | \$49 |
| 28 Foreign keyboards in stock | \$C41 |
| 1MBx9 SIMM/SP module 70/60ms | \$C41 |
| High speed Serial Mouse | \$19 |
| Autolink/Colorado 2500MB bit Tape | \$179/\$189 |
| Adium LUDDSS et CDROM kit | \$199 |
| Sony CD-31A internal CD-ROM kit | \$209 |

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ADI

| | Config #A | Config #B | Config #C |
|--|-----------|-----------|-----------|
| ADI 3E+ | 4 | 4 | 8 |
| RAM 70-ns fast (Mbytes) | 4 | 4 | 8 |
| Teac 1.2 MB Floppy | ■ | ■ | ■ |
| Teac 1.4 MB Floppy | ■ | ■ | ■ |
| 16-bit IDE 2HD controller | ■ | ■ | ■ |
| 32-bit VLB IDE IO controller | ■ | ■ | ■ |
| Hard Drive (Mbytes) | 170 | 256 | 340 |
| HD access time (ms) | 17 | 13 | 13 |
| HD cache (KBytes) | 32 | 64 | 128 |
| S3 805 1MB VLB video | ■ | ■ | ■ |
| ATI Ultra Pro 2MB VLB video | ■ | ■ | ■ |
| ADI 3E+ 14" 1024 Non-Interlace | ■ | ■ | ■ |
| Desktop or Mid Tower | ■ | ■ | ■ |
| 230W UL Power Supply | ■ | ■ | ■ |
| 2 Serial, 1 Parallel, 1 Game ports | ■ | ■ | ■ |
| Maxi Switch 101 Keyboard | ■ | ■ | ■ |
| MSDOS 6, Windows 3.1 | ■ | ■ | ■ |
| Mouse, software bundle | ■ | ■ | ■ |
| Base System \$ | \$1,212 | \$1,466 | \$2,042 |
| (add to motherboard price) | | | |
| Windows for Workgroups add-on with 16bit NE2000 compatible Ethernet card | \$99 | \$99 | |

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- Knowledgeable, trained scanner consultants who are eager to help you decide which product bundle will serve your needs.
- Unlimited lifetime technical support by ENVISIONS' trained scanner specialists.

And here's how we do it:

ENVISIONS scanner hardware is manufactured at a state-of-the-art imaging facility with ongoing R & D. New developments in technology are continually implemented in ENVISIONS products.

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Our reputation is outstanding!

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Top 40 Vendors
August 1993

PC Computing

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(7226)

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Twain
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Optional slide, x-ray and
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ENV8100 EST9101

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feeder makes text scanning easier!

\$399

ENV510024Pro
EST98000
ENV8100 EST98010

Unbeatable New Bundles from the Leaders in Scanning

Computer Shopper readers voted us the best—now the best costs less! And, you get more bang for your buck with our powerful scanner/software bundles at these newly reduced prices! ENVISIONS' award-winning scanners have teamed up with Xerox and Adobe to bring you a choice of three complete text and image scanning solutions!



For text scanning: Xerox Imaging Systems delivers its 20 years of mainframe OCR technology to the desktop scanning market with an extended version of TextBridge. This pumped-up OCR package is ONLY available from ENVISIONS!

For image scanning: Imagine what you can create with Adobe's Photoshop LE 2.5 for Windows! The acclaimed Photoshop has revolutionized the world of image enhancement with feature-rich editing tools. This famous image editor is yours free with any ENVISIONS flatbed scanner!

Choose 600, 800, or 1200 dpi

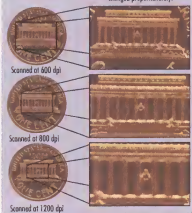
- 600, 800, or 1200 dpi base resolutions
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- 256 greyscale deliver rich-toned scans
- 8.5" x 14" scan window takes legal size documents
- 51 steps of brightness, contrast, threshold
- Self-aligning optics produce high resalvability and reads fine line art details
- Single light source ensures exact color registration
- On-board input/output buffer quickens scan time
- 30 day money back guarantee and 1 year warranty
- Optional transparency attachment or document feeder

In speed and accuracy tests against six top brands, "the (ENV6100) read and processed each page with zero errors."

—PC Sources 4/92 The ENV6100 contains the same scanner engine as the UMAX630, used in this test.

Our penny scans illustrate the facts. A high resolution scanner delivers a truer, crisper image, especially when enlarged. No other scanner in this class can scan a penny—and capture Lincoln sitting in his monument—as well as ours!

Scanned down to 286 dpi, size changed proportionately:



| Scanner | Base Resolution Max. Resolution | Part # | Price Was | New Price |
|----------|------------------------------------|----------|--------------|---------------|
| ENV6100 | 600 dpi/1200 dpi | EST3022B | \$999 | \$899 |
| ENV8100 | 800 dpi/1600 dpi | EST3023B | \$1249 | \$1099 |
| ENV24Pro | 1200 dpi/2400 dpi | EST3029B | \$1999 | \$1899 |

With TextBridge on the ENV6100, you can scan and recognize text this size (8 points) with near 100% accuracy!

With TextBridge on the ENV8100 and 24Pro, you can scan and recognize text this size (8 points) with near 100% accuracy!

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Local (415) 692-9061 • Fax (415) 692-9064 Envision Solutions Technology, Inc., 822 Muller Road, Burlingame, CA 94010

called software requires 386 or higher, Windows 3.1, (ISA) also available for interface card. PS/2 MCA, and reliable.

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Free

ADOBE™ & Xerox Software,

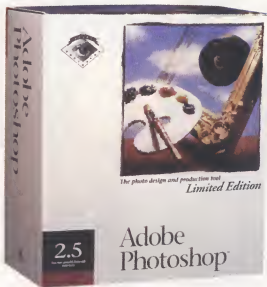


Image Editing Power Tools

Adobe Photoshop LE 2.5 image editing software offers an easy-to-use working environment for production artwork. Photoshop LE lets you create your own original art, edit scanned images, and import renderings from other applications. A variety of built-in painting, editing, and color correction tools ensures that you get professional-quality results. Photoshop LE supports EPS, TIFF, TARGA, PICT, and Photoshop file formats for easy import/export of image files.

- Work in bitmap, grayscale, indexed color or RGB color modes
- Approximately 19 filters for applying special effects to images: Blur, Gaussian Blur, Mosaic, Sharpen, Find Edges, and many more! Many filters have unique controls to achieve more impact.
- Full tool palette: Text tool lets you lay words over an image, crop selections, rubber stamp unwanted flows
- New Variations feature lets you adjust color by viewing a choice of thumbnail samples (shown, right)
- Quick Mask mode lets you view a mask and the image simultaneously while editing
- Dodge and Burn tool lets you lighten or darken specific areas of an image
- Resize and resample images, flip, skew and rotate to achieve desired effects

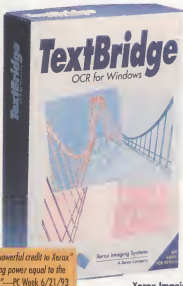


Variations feature does the color correction for you!

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TextBridge is "a powerful credit to Xerox" with "raw processing power equal to the high-end packages." —PC Week 6/21/93

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Xerox, the inventors of OCR technology, introduces new TextBridge for Windows. Developed at the legendary Xerox PARC labs, this is the easiest to use interface on the OCR market today! Its consistent recognition accuracy and simplified interface gets you up and working, fast. TextBridge employs powerful Lexia™ technology to identify patterns or classes of information such as postal codes to achieve higher accuracy than the leading OCR packages. TextBridge is the answer for real-world document processing challenges!

- Simple one-button operation lets you get up and running immediately—just press "GO!"
- Scan text directly into Word™ for Windows, WordPerfect™, AmiPro™ without leaving your word processor
- The best OCR for reading poor-quality faxes!
- Recognizes text in English, German, Spanish, French (Italian available)
- Perfect recognition on skewed text—crucial for automatic document feeder processing and recognition of crooked photocopies. Documents can even be read upside down!
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- Automatic page segmentation removes photos and outputs converted text in the correct order
- "Print Scan" feature, only available with ENVISIONS scanners, lets you perform OCR within any Windows application! Simply "Print" your scanned document in its "image state" to TextBridge's OCR processor



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ENVISIONS: (Full) scanner and 4MB RAM, 8MB hard disk only for Apple® Macintosh® computers only

ENVISIONS' Bundles are More Logical Than Logitech™



By Far!



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Let's be reasonable. Both ENVISIONS and Logitech offer terrific hand-held scanners with premium software to scan text and graphics. They both can scan full pages using outmerge technology. Then why does Logitech make you pay so much more? We can't figure it out either. It's not logical!

Grayscale

ENV256 Grayscale Scanner and Software Bundle!

ENV256 Scanner, HALO Desktop Imager, Perceive Personal OCR, Clip Art Library, ScanPad

Total Value \$557

\$179 On Sale Was \$199

EST4530B

| Features and Bundled Items: | ENVISIONS ENV256™ | Logitech ScanMan™256 | ENVISIONS ENVColor™ | Logitech ScanMan™Color |
|----------------------------------|--|------------------------------|--|-------------------------------------|
| Resolution | Up to 400 dpi | Up to 400 dpi | Grayscale 400 dpi Color: 200 dpi | Grayscale 400 dpi Color: 400 dpi |
| Grayscales/Color Capability | 256 Grayscales | 256 Grayscales | 262,144 Colors | 16,800,000 Colors |
| Automerge/AutoSitch | ✓ | ✓ | ✓ | ✓ |
| Image Editing Software Included: | HALO Desktop Imager PC Magazine's Editors' Choice | FotoTouch by Logitech | HALO Desktop Imager PC Magazine's Editors' Choice | FotoTouch Color by Logitech |
| Text Scanning Software Included: | Perceive Personal | Catchword Pro by Logitech | Perceive Personal | Available at additional cost |
| Free Clip Art Library & ScanPad | ✓ | Available at additional cost | ✓ | Available at additional cost |
| Your Price | \$179.00 | \$279.99* | \$279.99 | \$524.99* |

*Average of three prices quoted by Eighthead Software stores in the San Francisco Bay Area on July 6, 1993.
Hand Scanner Bundles require 386 or higher, Windows 3.1, 4MB RAM, 8MB hard disk space free

Color

ENVColor Scanner and Software Bundle!

ENVColor Scanner, HALO Desktop Imager, Perceive Personal OCR, Clip Art Library, ScanPad

Total Value \$674

\$279 On Sale Was \$299

EST4455B

Your scanner comes bundled with text scanning software, image editing software, plus a scanpad and clip art library!

Free with scanner!



Free with scanner!



Free with scanner!



Ready-To-Scan Images with Neat ScanPad, Free!

ENVISIONS' Clip Art has over 13 categories of hundreds of useful images. The ScanPad holds pages in place while scanning. Use both to add eye-catching documents! Value \$39.95

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HALO Desktop Imager brings full desktop scanner power to your hand-held! Auto-merging assembles multiple scans with ease. Powerful printing capabilities! Retail Value \$139

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—Bob Temple, Hackettstown, NJ

"ENV256 installed easily and worked wonderfully. Documentation was good. Thanks!"
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Circle the numbers below corresponding to products featured in this issue's advertisements and listed in the Editorial Product Index. Manufacturers will mail product literature to you free of charge.

Valid after December 31, 1993

PRODUCTS FEATURED IN ADVERTISEMENTS

PRODUCTS FEATURED IN EDITORIAL

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 |
| 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 |
| 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 |
| 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 |
| 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 |
| 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 |
| 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 |
| 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 |
| 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 |
| 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 |
| 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 |
| 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 |
| 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 |
| 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 |
| 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 |
| 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 |
| 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 |
| 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 |
| 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 |
| 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 |

Please answer questions below:

1. Where do you use your computer? (Check one only):

A ☐ At Home B ☐ Business C ☐ Both

2. What kinds of computers do you use? (Check all that apply)

D ☐ IBM/Compatible Laptop E ☐ IBM/Compatible Desktop F ☐ MAC

3. Do you plan to buy any of the hardware or software mentioned below in the next three months? (Check all that apply):

HARDWARE

G ☐ PC
H ☐ MAC
I ☐ Laptop
J ☐ Printer
K ☐ Monitor
L ☐ Disk/Tape Back-up
M ☐ Add-in Board
N ☐ Modem
O ☐ Input Device
P ☐ Local Area Network

SOFTWARE

Q ☐ Accounting
R ☐ Spreadsheet
S ☐ Personal Finance
T ☐ Desktop Publishing
U ☐ Word Processor
V ☐ Database Manager
W ☐ Graphics
X ☐ Utility

Y ☐ Communications
Z ☐ Windows/Multi-tasking
1 ☐ Programming Language/
Computer
2 ☐ Integrated/Multifunction
3 ☐ CAD

4. From which of the following sources do you purchase personal computer products?

(Check all that apply)

4 ☐ Specialty Computer Retail Stores 6 ☐ Direct from Manufacturers
5 ☐ Mail Order Firms 7 ☐ Other

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Please answer questions below:

1. Where do you use your computer? (Check one only):

- A. ☐ Home B. ☐ Business C. ☐ Both

2. What kinds of computers do you use? (Check all that apply):

- D. ☐ IBM/Compatible Laptop E. ☐ IBM/Compatible Desktop F. ☐ MAC

3. Do you plan to buy any of the hardware or software mentioned below in the next three months? (Check all that apply):

- | | |
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| H. <input type="checkbox"/> MAC | R. <input type="checkbox"/> Spreadsheet |
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| J. <input type="checkbox"/> Printer | T. <input type="checkbox"/> Desktop Publishing |
| K. <input type="checkbox"/> Monitor | U. <input type="checkbox"/> Word Processor |
| L. <input type="checkbox"/> Disk/Type Back-up | V. <input type="checkbox"/> Database Manager |
| M. <input type="checkbox"/> Add-in Board | W. <input type="checkbox"/> Graphics |
| N. <input type="checkbox"/> Modem | X. <input type="checkbox"/> Utility |
| O. <input type="checkbox"/> Input Device | |
| P. <input type="checkbox"/> Local Area Network | |

4. From which of the following sources do you purchase personal computer products?

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5. ☐ Mail Order Firms 6. ☐ Other

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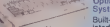
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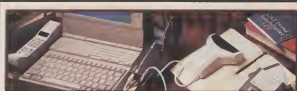


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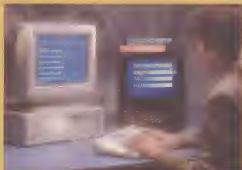
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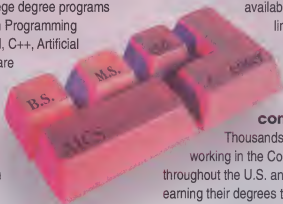
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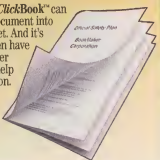
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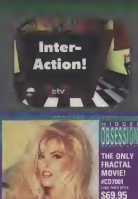
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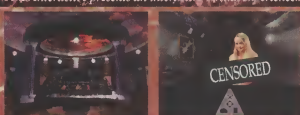
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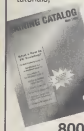
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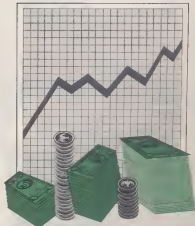
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INTERNET: PRESIDENT@ WHITEHOUSE.GOV

Re: Any damn thing about how this damn country should be run.

PEOPLE IN POWER care about letters. *PC/Computing* gets fewer than a dozen letters about my use of *goddamn* in a column, and I can't use the *goddamn* word anymore. TV networks are terrified of that Wildmon nut and his group of fundamentalists because they *write* letters about boycotts. The honchos don't even see many actual letters. "We had a few more letters complaining about all the Uma Thurman references in Jillette's column," that's all they hear.

Who the hell writes letters? Nuts. Nuts write letters. If you have friends and a job, or you know how to use the remote on your TV or turn the page of a magazine, you don't write letters. While you're licking that stamp, entropy takes a chunk of your precious life. You don't have time, so nuts fill the vacuum.

By the time I voted in the last election, New York was already sure to give the electoral votes to Clinton. I could have voted for absolutely anybody (and boy, did I). No one sincerely wanted

Bush or Clinton, but some of us still voted. "Of," "by," and "for."

It used to be that a regular citizen could just talk to the president. Mary Todd Lincoln used to reprimand Abe for answering the White House door himself (I didn't make this up, Teller heard it from a friend, who probably made it up). People would walk in, sit down, and yak to the president of the United States. But with mediocre actors, Jodie Foster fans, and characters in Ollie Stone movies pumping lead into them, presidents have become less accessible.

But the president still pays attention to letters. Did you see that fast 180 when they got "thousands of letters" against that Nannygate-almost-attorney-general? Thousands—that's not that many. Clearly the way to vote is to write letters. And now it's easier!

Clinton and his faithful assistant, Algore, have Internet, CompuServe, and a couple of other addresses. No envelopes, no nothing—you just write a

letter to the chief as part of your daily e-mail ritual. Modem your beefs. Don't worry about quality. Don't expect an answer. A lackey will read it and make a check in the correct column. You're just voting, but you're voting in a sample of thousands, not tens of millions. Don't worry about being funny or witty, and you don't need to make a brilliant case. Just write, "Yo, Slick Willy, the Clipper Chip sucks. Don't compromise our privacy," and you're done.

I'm going to be a nut and start writing every day, so if you don't think Uma Thurman deserves a high government post, you'd better write to >INTERNET: PRESIDENT@ WHITEHOUSE.GOV and put in your two cents.

While we're writing, let's ask Bill about this: The guy who's painting my apartment (a source they don't quote often enough in the *New York Times*) said that a friend of a friend of his (you already know it's got to be true) who is high up in the government (and spills secrets to painters) said that Clinton wasn't holding up LAX for a haircut on Air Force One, but rather to "visit" with an actress who fancies herself Marilyn Monroe to his JFK. Even though the source is as reliable as the paint job on my walls, I don't believe it. It's too good to be true (although this rule of thumb sure broke down on Swaggert and the hooker, didn't it?). We should at least ask.

Oh, by the way, >INTERNET: VICE-PRESIDENT@ WHITEHOUSE.GOV will get you Al, and he probably doesn't get more than a dozen letters a day, so you'd really have power if you wrote to him. ■

Penn & Teller will be regular guests on the new David Letterman show.

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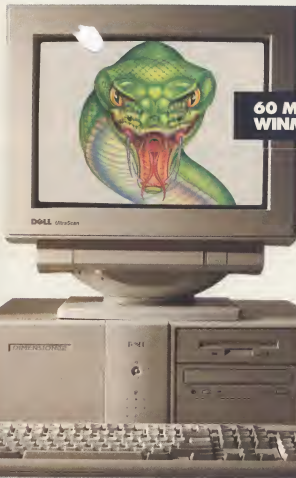
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*Dell assumes no responsibility for face-warping acceleration impacts **Performance measured by running WinBench version 3.11 at 1024 x 768, 256 colors